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Assessing Behavioural Flexibility in  
Children with Autism Spectrum Disorder  
Using Play-Based Procedures

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Philosophy at the University of Tasmania

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## Publications Arising from the Thesis

- Ollington, N., Green, V.A., O'Reilly, M.F., Lancioni, G.E., Didden, R. (2012). Functional analysis of insistence on sameness in an 11-year old boy with Asperger syndrome. *Developmental Neurorehabilitation*, 15 (2), 154-159.
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## Statement of Ethical Conduct

The research conducted for the purpose of this thesis abides by the international and Australian codes on human and ethical experimentation, and ethical principles and procedures have been followed in accordance with National Health and Medical Research Council guidelines. Ethical clearance was obtained from the Human Research Ethics committee (Tasmania).

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## Abstract

Insistence on sameness and resistance to change are key characteristics of autism spectrum disorder (ASD). These ASD traits are known to cause severe problem behaviour, stress, and anxiety, and often continue well into adulthood, frequently leading to ongoing tension for the parents and caregivers of individuals with the disorder. This lack of behavioural flexibility is suggested to be “higher order” behaviour more common in individuals with “high functioning autism”, and is also known to occur in other developmental disorders, as well as during the early years of typical development. There is very little empirical research within the scientific literature that investigates the nature and assessment of insistence on sameness and resistance to change, despite positive indications for function-based treatment to increase behavioural flexibility. More specifically, it is not known if insistence on sameness and resistance to change is functional and, as such, motivated by some type of environmental change that operates as reinforcement for the behavioural acts related to it. This thesis contributes empirically to this emergent field of research, and develops new ways to address the problem behaviours associated with insistence on sameness and resistance to change in children with ASD.

There are three components to this research that examine a novel play-based functional assessment procedure constructed around the *Behavioural Flexibility Rating Scale-Revised* (BFRS-R, Green, et al., 2007), and modelled on the procedures of Green et al. (2008), and Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994). As the *BFRS-R* is a relatively new instrument, the first study examined aspects for validation of this scale that have not previously been investigated. The

parents of 43 children with and without ASD responded to a battery of behavioural assessments, including a focus on flexible behaviour. Parents reported greater levels of inflexible behaviour in children with high functioning autism (HFA) and low functioning autism (LFA) than typically developing children, as well as differences surrounding the function of the behaviour among these three groups. The study also identified distinct items on the *BFRS-R* that may be particularly useful in differentiating between ASD and typical development. In addition to this, the study demonstrated that the extent of children's behavioural flexibility may be associated with further characteristics of ASD, over and above group status (i.e. typically developing, HFA, LFA).

The second and third studies investigated the novel functional play-based assessment procedure for identifying the motivational properties of problem behaviour associated with a lack of behavioural flexibility. The play-based functional assessment used three scenarios that were created to correspond with parent-reported situations of insistence on sameness and resistance to change on the *BFRS-R* (Green, et al., 2007), with problem behaviour observed under four conditions (gaining access to tangible items, gaining social attention, escaping the situation, restoring the environment to its previous state) in a multi-element format. The second study examined insistence on sameness and resistance to change in an 11-year old boy with Asperger syndrome. The third study further evaluated the play-based functional assessment by comparison with a corresponding indirect assessment, the *Motivation Assessment Scale* (MAS, Durand & Crimmins, 1992). In this study the results for two boys (a typically developing 4-year old, and a six-year old boy with autism) were compared. Overall, the play-based functional assessment appears to be

particularly useful for children with ASD. The play-based functional assessment was successful in occasioning insistence on sameness and resistance to change, and was able to differentiate motivations for insistence on sameness and resistance to change in the child's natural environment according to the specific scenarios in which they occurred. That is, observations suggested that problem behaviours related to a lack of behavioural flexibility may be motivated by specific types of environmental consequences, and that the specific maintaining consequence may be dependent on the type of scenario in effect.

Taken together, the findings of this series of studies have important implications in terms of the assessment of possible idiosyncratic inflexible behaviours in children with ASD. The play-based functional assessment demonstrates the potential to inform early targeted function-based treatments for children with ASD by providing a context for the type of intervention required, thus decreasing the risk for these behaviours to become ingrained.

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## List of Frequently used Acronyms/Abbreviations

ABC	Aberrant Behavior Checklist
ADI-R	Autism Diagnostic Observation Schedule-Revised
AS	Asperger syndrome
ASD	Autism spectrum disorder
BFRS-R	Behavioural Flexibility Rating Scale-Revised
CARS	Childhood Autism Rating Scale
DSM-IV	Diagnostic and Statistical Manual of mental Disorders- 4 <sup>th</sup> Edition
DSM-IV-TR	Diagnostic and Statistical Manual of mental Disorders- 4 <sup>th</sup> Edition, Text Revision
GARS-2	Gilliam Autism Rating Scale-2 <sup>nd</sup> Edition
HFA	High functioning autism
ICD-10	International Statistical Classification of Diseases and Related Health Problems, 10 <sup>th</sup> Revision
IQ	Intelligence quotient
IS	Insistence on sameness
LFA	Low functioning autism
OCD	Obsessive compulsive disorder
MAS	Motivation Assessment Scale

PDD	Pervasive developmental disorder
PDD-NOS	Pervasive developmental disorder-Not otherwise specified
SSP	Short Sensory Profile
TD	Typical development
Vineland-II	Vineland Adaptive Behavior Scales-2 <sup>nd</sup> Edition

# **Chapter 1**

## **Introduction**

Obsessive insistence on sameness and extreme resistance to environmental change are characteristics of autism (Kanner, 1943) and the wider spectrum of autism (i.e., Autism Spectrum Disorder or ASD). These two aspects of ASD have also been referred to as stemming from, or indicating, a lack of behavioural flexibility (Green et al., 2006; Wahlberg & Jordan, 2001).

An insistence on sameness and resistance to change can manifest in several types of behaviours, and the form of manifestation may differ across individuals (Prior & MacMillan, 1973). For example, for some children a change in the environment can prompt a severe tantrum, while in others it may bring about anxiousness that is expressed by tearfulness, or ‘acting out’. Not surprisingly, a lack of behavioural flexibility has been linked to a variety of negative outcomes, such as increased stress and anxiety and serious problem behaviours (Billstedt, Gillberg, & Gillberg, 2007; Chamak, Bonniau, Jaunay, & Cohen, 2008; Rodgers, Glod, Connolly, & McConachie, 2012; Zandt, Prior, & Kyrios, 2007). Efforts to reduce the person’s tendency to insist on sameness and resist change—and efforts to increase behavioural flexibility—therefore represents an important treatment priority for many children with ASD and related disorders. To this end, interventions aimed at reducing insistence on sameness and resistance to change by teaching the child to be more flexible and tolerant in the face of changes may hold promise (Green et al., 2008). Despite positive indications for treatment, there is a lack of focused evidence

based research to investigate insistence on sameness and resistance to change (Boyd, McDonough, & Bodfish, 2011).

Though a lack of behavioural flexibility has also been observed in children with various types of disorders (Didden et al., 2008; Evans & Gray, 2000; Zandt et al., 2007) and in typically developing children (Evans et al., 1997; Glenn, Cunningham, & Nananidou, 2012; Leekam et al., 2007), available evidence suggests that insistence on sameness and resistance to change are more common in individuals with ASD (Didden et al., 2008; Green et al., 2006). In addition to this, there is evidence to suggest that insistence on sameness and resistance to change may increase in both frequency and intensity over time for individuals with ASD (Richler, Huerta, Bishop, & Lord, 2010). Nevertheless, the nature, assessment, and treatment of sameness behaviour in ASD have received relatively little empirical attention within the scientific literature (cf. Bodfish, 2011; Boyd et al., 2011; Green et al., 2006).

Thus the overarching aim of this thesis is to contribute empirically to the understanding of this emergent field of research. The research presented was designed to develop new ways to address insistence on sameness and resistance to change in children with ASD. This introductory chapter outlines the framework for the structure of the thesis. To begin with it is important to understand the nosology of ASD.

### **Delineation of Autism Spectrum Disorder**

Autism Spectrum Disorder (ASD) is classified, according to the *Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition* (DSM-IV-TR,

American Psychiatric Association, 2000) and the *International Statistical classification of Diseases and Related Health Problems, 10<sup>th</sup> Revision* (ICD-10; World Health Organisation, 1990) as a pervasive developmental disorder (PDD). Individuals with a PDD show qualitative impairments in a number of areas encompassing verbal and non-verbal communication, reciprocal social interaction, and behavioural activities, such as restricted and repetitive behaviour.

PDDs can vary according to the number or type of symptoms, and also with the age of onset of particular symptoms (Szatmari et al., 2000). Around 75-80% of PDD cases are accompanied by some degree of intellectual disability (American Psychiatric Association, 2000). Over the past 20 years there has been growing acknowledgement surrounding the vast variation in clinical expression of PDD, which has led to broader classification systems, for instance, ASD (Snow & Lecavalier, 2011). The following sections will provide a brief overview of ASD, and the *DSM-IV-TR* criteria applicable to classification of the three most prevalent ASDs. The *ICD-10* classification system for ASD is equivalent to the *DSM-IV-TR*, and as such the former system will not be discussed further in this thesis.

### **Autism spectrum disorders.**

ASD is a group of neurodevelopmental disorders that are generally diagnosed in early childhood (Matson, Hess, Neal, Mahan, & Fodstad, 2010). The most commonly diagnosed subtypes of PDD that fall under the ASD category are: (a) autism, (b) Asperger's syndrome, and (c) Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS). Also designated as an ASD, however less commonly diagnosed, are Rett syndrome and Childhood Disintegrative Disorder

(Chakrabarti & Fombonne, 2005). Though similar to the other ASD conditions, Childhood Disintegrative Disorder and Rett syndrome also contain distinctive diagnostic features (Sigafos, O'Reilly, & Lancioni, 2009). For example, both are marked by regression, and Rett syndrome is now known to be caused by a genetic mutation, and is more common in females (Shao et al., 2003; Sigafos et al., 2009). In contrast, the other three ASD categories tend to occur mostly in boys, and appear to be much less often regressive in nature (American Psychiatric Association, 2000). With this in mind, the current thesis will concentrate on autism, Asperger syndrome, and PDD-NOS, as these seem to share similar characteristics that differ mainly in pattern and severity (Matson, Dempsey, & Fodstad, 2009; Ozonoff, South, & Miller, 2000).

### ***Autism.***

Symptoms of autism are usually evident in the first three years of life (American Psychiatric Association, 2000). As such, to obtain a diagnosis of autism, an individual must manifest a pronounced impairment during these early years in the three PDD domains: (a) social interaction; (b) communication; (c) restricted, repetitive and stereotyped patterns of behaviour and interest. These include deficits in at least two of the following social areas: (a) multiple non-verbal behaviours; (b) developing appropriate peer relationships; (c) spontaneous desire to share activities, interests and enjoyment; (d) social and emotional interchange. At least one of the following communication impairments must also be present: (a) a delay in speech development; (b) difficulties initiating or sustaining conversation; (c) stereotyped, repetitive, or idiosyncratic language; (d) a lack of imaginative play appropriate to developmental level. At least one of the following restricted, repetitive and

stereotyped patterns of behaviour must also be present: (a) restricted patterns of interest or stereotyped behaviour; (b) inflexible adherence to non-functional routines and rituals; (c) stereotyped and repetitive motor mannerisms; (d) preoccupation with object parts (American Psychiatric Association, 2000).

Impairments consistent with *DSM-IV-TR* (American Psychiatric Association, 2000) criteria for autism tend to present themselves in differing ways for different individuals (Gotham, Bishop, & Lord, 2011). In relation to the social interaction domain, for example, one individual may display a complete lack of direct eye contact whereas another may make eye contact, albeit in an unusual way. For some children there may be a total disregard for other's attempts at conversation, and for others there may be impulsive interruptions to a conversation, often regarding a favourite topic. Regarding communication, there may be stereotyped speech, pronoun reversal, or repetitive questioning. In regard to restricted/repetitive and stereotyped behaviour, although one individual may demonstrate repetitive hand flapping, another may obsessively collect and discuss all there is to know about a particular subject.

These differences are thought to be associated with the individual's developmental level and also their level of intellectual function (Zandt et al., 2007). As such, individuals with autism are commonly viewed as 'high-functioning' or 'low-functioning' based on intellectual ability (Gotham et al., 2011). That is, when intellectual disability is absent the categorisation that is often applied is high-functioning autism (HFA). On the other hand, when an intellectual disability is present, the categorisation is likely to be that of low-functioning autism (LFA). A familiar pattern for a number of children showing the classic signs of autism in early

childhood is to show vast improvements in cognitive ability, language and communication, and adaptive behaviour as they develop (Ozonoff, Goodlin-Jones, & Solomon, 2005). As such these individuals who begin with a diagnosis of LFA may be later provided with a diagnosis of HFA. These individuals have been compared to high-functioning individuals with Asperger syndrome, who demonstrate similar impairments (Attwood, 2006).

### ***Asperger syndrome.***

Asperger syndrome is defined according to the *DSM-IV-TR* (American Psychiatric Association, 2000), as a PDD displaying no clinical language or cognitive delays. As such, to obtain a diagnosis of Asperger syndrome, an individual must meet criteria for severe impairment in: (a) social interaction; (b) restricted, repetitive and stereotyped patterns of behaviour and interest. *DSM-IV-TR* impairments listed under these categories for Asperger syndrome are identical to those for autism; however, in order for a diagnosis of Asperger syndrome to be made, autistic disorder must first be ruled out (American Psychiatric Association, 2000).

Though the *DSM-IV-TR* (American Psychiatric Association, 2000) stipulates that there should be no delay in communication for individuals with Asperger syndrome, there are nevertheless features of the individual's speech and language that may be odd. For example, intonation may be flat, and there may be pedantic speech and/or one-sided conversations (Gotham et al., 2011). It has also been argued that individuals with Asperger syndrome may have difficulties translating their thoughts into words (Attwood, 2006b).



### ***Pervasive Developmental Disorder-Not Otherwise Specified.***

PDD-NOS is one of the most frequently diagnosed, yet one of the least understood subtypes of ASD (Snow & Lecavalier, 2011). Indeed, the *DSM-IV-TR* (American Psychiatric Association, 2000) provides limited information for identifying this subtype in comparison to autism and Asperger syndrome. Rather, PDD-NOS, is a classification that is provided for cases that do not quite meet all of the criteria for diagnosis of autism or Asperger syndrome. Individuals placed in this category for example, may show symptoms in only one or two of the autism or Asperger syndrome domains, or alternatively fall just outside the threshold of requirements in all domains (Gotham et al., 2011).

### **Associated symptoms.**

Alongside the requisite indicators of ASD described in the previous sections, there are a number of associated symptoms that have been observed in many children with ASD, that vary in frequency and severity (Gabriels, Cuccaro, Hill, Ivers, & Goldson, 2005). Associated symptoms include, but are not limited to impaired adaptive functioning, that is impairments in the ability to independently accomplish day to day living skills (Sparrow, Cicchetti, & Balla, 2005), and sensory sensitivities/unusual sensory response, for example tactile, taste/smell, audio, and visual sensitivities (Gabriels et al., 2008; Smith-Myles et al., 2004). There have also been reports of unusual perceptual attention (Fletcher-Watson, Leekam, Turner, & Moxon, 2006; Happe & Frith, 2006), anxiety (Chalfant, Rapee, & Carroll, 2007; Kim, Szatmari, Bryson, Streiner, & Wilson, 2000; Ozsivadjian & Knott, 2011), and challenging behaviours, for example: aggression and self-injury (Hartley, Sikora, &

McCoy, 2008; Machalicek, O'Reilly, Beretvas, Sigafoos, & Lancioni, 2007; Matson, 2009; Singh, Lancioni, Winton, & Singh, 2011). It has been suggested that some of these associated symptoms may increase the risk for problem behaviour in children with ASD (O'Reilly et al., 2010).

Importantly, a number of these associated symptoms have also been suggested to be associated with core indicators of ASD (Baron-Cohen, Ashwin, Ashwin, Tavassoli, & Chakrabarti, 2009; Boyd et al., 2011; Green, et al., 2008; Hilton et al., 2010; Sukhodolsky et al., 2008). As such they may play mediating roles in the manifestation of core symptoms such as an insistence on sameness and resistance to change. The accumulation of evidence to suggest strong relationships between the core symptoms of ASD and its associated symptoms, or alternatively to refute these assumptions, has important implications for diagnostic criteria and treatment options for individuals with ASD (Boyd et al., 2010). Though currently these symptoms are mentioned within diagnostic manuals such as the *DSM-IV-TR* (American Psychiatric Association, 2000), they are not required to be present for diagnosis.

### **Diagnosis of autism spectrum disorder.**

ASD diagnosis is becoming increasingly more common (Prior, 2003; Rapin, 2011). Diagnosis of ASD often involves a multidisciplinary team, e.g. Psychologist, Paediatrician, Speech Pathologist, Occupational Therapist, who undertake assessment using standardised measures as well as clinical observation (Matson et al., 2010). Parents are often interviewed in order to obtain a detailed developmental history, or asked to complete indirect assessments of the child's characteristics.

There are a vast number of assessments available to diagnose ASD, and their use is often informed by the intended purpose and relative convenience (Gotham et al., 2011). Increasingly, clinicians are realising the importance of a direct assessment to observe the child's behaviour in natural settings. However, because of time constraints, the need for expertise in observational methods, and the potential costs involved, these types of assessments are not always available to all individuals (Gotham et al., 2011). This highlights an important need for innovative research to develop new and better ways of assessing the particular characteristics of autism that differentiate these children from a typically developing child as well as those with other developmental disorders. A move towards consistent diagnostic methods may also be an important initiative for clinicians, as differing diagnostic practices may have an impact on treatment plans (Gotham et al., 2011) as well as prevalence information (Fombonne, 2005; Prior, 2003).

### **Prevalence and incidence.**

Prevalence information regarding ASD has changed considerably since initial documentation of the disorder (Rapin, 2011). Indications of this change are not clear, but could include differing data sources and diagnostic practices (Fombonne, 2005; Prior, 2003). For example, prevalence rates for autism in Australia are confounded by the different state and territory data sources (Williams, MacDermott, Ridley, Glasson, & Wray, 2008). Additional suggested influences include diagnostic switching, for example from a mental retardation diagnosis to a PDD; decreased age at diagnosis; changing methods of identification, diagnostic concepts and practices; and the increasing availability of services that improve symptomology (Fombonne, 2005; Williams, Higgins, & Brayne, 2006). The application of ASD subtypes

(Rapin, 2011) and the increasing awareness of overlap between those subtypes (Prior et al., 1998), have also been indicated to have impacted prevalence over time.

Current combined estimates per 10,000 births, derived from worldwide epidemiological studies are as follows: PDD: 70/10,000, equivalences = 7 per 1000 births (Fombonne, Quirke, & Hagen, 2011); ASD: 60-70/10,000, equivalences = 6-7 per 1000 births (Fombonne, 2009), autism: 20.6/10,000, equivalences = 2.06 per 1000 births; Asperger syndrome: 6/10,000, equivalences = 0.6 per 1000 births; PDD-NOS: 37.1/10,000, equivalences = 3.71 per 1000 births (Fombonne, 2009). Fombonne (2005), suggested that current estimates should be regarded as an underestimation of the 'true' prevalence rates. When placed together with the multifaceted justifications of the apparent rise in ASD cases over time, the underestimation of true prevalence rates indicates a need for up-to date procedures to assess the various features of ASD in order to enable the delivery of comprehensive treatments that lead to improved outcomes in children with ASD.

### **Scope of the Research**

The studies outlined in this thesis were designed to clarify specific questions surrounding insistence on sameness and resistance to change that as yet remain unanswered, and to explore new ways of assessing the behaviour for treatment purposes. The following paragraphs outline the rationale and aims of the thesis.

Current evidence suggests that not only is insistence on sameness and resistance to change perhaps more common in individuals with ASD (Didden et al., 2008; Green, et al., 2006; Prior & MacMillan, 1973), but that it may also be associated with higher levels of functioning in children with ASD (Green et al.,

2006; Turner, 1999). However, further investigations are required to confirm whether insistence on sameness and resistance to change represents a distinguishing feature between children with ASD and children without ASD, or between high- versus-low-functioning ASD. Thus, in an attempt to determine possible differential characteristics of the behaviour, the research in the current thesis included studies comparing typically developing children and children with a reported ASD, as well as children described as HFA and LFA. A key aim of this latter comparison was to provide evidence for the external validity of insistence on sameness and resistance to change as a function of ASD severity.

Existing evidence also points towards the possibility that there are may be mediating factors at play when children respond inappropriately to change (Winter & Schreibman, 2002). Thus an additional aim was to consider possible influences on children's reactions to insistence on sameness and resistance to change. Gaining a deeper understanding of some of the possible mediating relationships of particular variables on core characteristics such as insistence on sameness, can also assist with the identification of treatments that may be modified in accordance with individual idiosyncrasies that may be susceptible to change over the life course. Isolating potential links between the problem behaviour observed and the context in which insistence on sameness and resistance to change occur may help us to further understand the function, or purpose of the behaviour, which is a key focus of this thesis.

An important component in the search for effective interventions may be a prior assessment to understand the function or purpose of behaviours that indicate an insistence on sameness or resistance to change. As yet it is unknown whether the

insistence on sameness or resistance to change often seen in individuals with ASD is indeed functional in the sense of being maintained by some type of environmental change that functions as reinforcement for behavioural acts that are related to the insistence on sameness and resistance to change. Thus, a primary focus of this thesis was to determine the functional characteristics, if any, of insistence on sameness and resistance to change in children with ASD.

To date, out of the few studies investigating insistence on sameness and resistance to change, there appears to be only one that has included the observation of behaviour that might facilitate treatment options (Green et al., 2008). Specifically, Green et al. developed a play-based assessment procedure for observing the skills that children might apply to enable them to cope with the frustration of change in their environment. These skills included problem solving tactics and tolerance for change. Scenarios were constructed to represent problem situations reflected in the *Behavioural Flexibility Rating Scale-Revised* (BFRS-R, Green et al., 2007), a 16 item questionnaire aimed at identifying situations where children lack behavioural flexibility.

While Green et al.'s (2008) play-based assessment appeared to be a promising methodology for identifying antecedent conditions that might have set the occasion for insisting on sameness or resisting change, the protocol was limited in that it did not include any assessment of the motivational consequences (reinforcers), if any, that might have been maintaining the child's insistence on sameness and resistance to change. It would also be important to identify the specific contexts in which inflexibility occurred most frequently. Once such consequences and contexts have been identified, the child might then be taught to cope with, and problem solve

in those specific contexts to achieve the same consequence or outcome that was previously achieved by resorting to inflexibility and its associated problem behaviour.

The current thesis aims to investigate a novel approach to the functional assessment of insistence on sameness and resistance to change. This approach extends Green et al.'s (2008) protocol to include the measurement of the motivation of the problem behaviour associated with an insistence on sameness and resistance to change. The direct play-based assessment, was adapted to operate around a multi-element functional assessment paradigm based on the procedures described by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994), and using four maintaining variables comparable to those outlined in the *Motivation Assessment Scale* (MAS, Durand & Crimmins, 1992), an indirect functional assessment protocol. This method also enabled an examination of the consistency of results across direct and indirect assessment procedures.

A key component of the play-based assessment is the use of a standardised rating scale; The *Behavioural Flexibility Rating Scale-Revised* (BFRS-R, Green, et al., 2007). Out of the few existing tools for measuring instances of insistence on sameness and resistance to change, the *BFRS-R* shows promise as a means for identifying associated problem situations. Green et al. (2008) demonstrated this potential in their play-based assessment study. Considering the *BFRS-R* is a relatively new instrument, it would seem important to also identify aspects for validation that have as yet not been investigated. Moreover, as there are no studies to date that have investigated the *BFRS-R* in typically developing children, this research further presents the opportunity to ascertain whether or not the *BFRS-R* is suitable

for use in typically developing populations, and whether the scale is able to discriminate between typically developing children, and children with ASD.

### **Research Hypotheses**

With these aims in mind, the following hypotheses were investigated:

1. Children with ASD will show more inflexible behaviour than typically developing children.
2. Children with HFA will display greater levels of inflexible behaviour than both LFA and typically developing children.
3. The relationship between group status (high/low functioning ASD, typical development) and behavioural flexibility will be mediated by adaptive function, sensory sensitivity, and/or affective response.
4. The function of problem behaviour associated with an insistence on sameness and resistance to change will be different for HFA, LFA and typically developing children.
5. The play-based functional assessment will prove to be a valid measure of the function of an insistence on sameness and resistance to change.

### **Structure of the Thesis**

Following from this introductory chapter, *Chapter 2* presents a review of relevant findings in relation to insistence on sameness and resistance to change. In order to appreciate the complexity of assessing particular characteristics of ASD, such as an insistence on sameness and resistance to change, *Chapter 2* begins with a



review of the literature surrounding the nosology and history of the disorder. This section focusses on the advancement of knowledge leading to questions surrounding diagnostic categorisation and the value of the three ASD subtypes that are a focus of this study (as outlined in this chapter). Following on from this, an up to date account of an insistence on sameness and resistance to change, focussing on its current position within the research literature is presented. Finally, a framework for the associated problem behaviour is provided, including descriptions of existing and potential assessment and intervention procedures. *Chapter 3* outlines the methodology used across the three studies. It describes the survey instruments used, as well as including a brief overview of the functional analysis procedures. In *Chapter 4*, an investigation of the characteristic and functional differences in behavioural flexibility in children with ‘high functioning’ and ‘low functioning’ ASD and typical development is presented. *Chapter 4* also expands on previous work (Didden et al., 2008; Green, et al., 2007; 2006) to further validate the *BFRS-R* (Green, et al., 2007). The play-based assessment, which is adapted to operate around a multi-element functional assessment paradigm, is presented as a case study in *Chapter 5*. *Chapter 6* examines the utility of the direct play-based assessment by way of comparison of the results obtained for two children on the play-based assessment with an indirect assessment approach using the *MAS* (Durand & Crimmins, 1992). Finally, *Chapter 7* provides a general overview and discussion of the main findings.

## **Chapter 2**

### **Background and Literature Review<sup>1</sup>**

This chapter will provide a review of the literature surrounding insistence on sameness and resistance to change, and methods to assess and treat the associated problem behaviour. Firstly though, in order to appreciate the complexity of assessing particular characteristics of ASD, such as an insistence on sameness and resistance to change, it is important to understand the history of the disorder. The first section of this literature review provides an account of the conceptual shift in ASD stemming from research comparing ASD groupings.

#### **History of Autism Spectrum Disorder**

The first descriptions of ASD were provided in the case studies of children presenting with unusual and atypical behaviour by Leo Kanner (1943) and Hans Asperger (1944). Kanner, for example, described 11 children of various ages who demonstrated a severely limited social response, such that they were disengaged, indifferent and fearful. Kanner's children also displayed stereotyped movements, and an obsessive preoccupation with detail. Many were non-verbal, or had limited use of language. On the other hand, Asperger was interested in the milder presentations of autism (Frith, 1991) and described four children who had difficulties with social integration, albeit with adequate intellectual functioning (Klin, 2011). Asperger's children were described as having 'clever sounding language' and 'invented words'

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<sup>1</sup> Parts of this chapter have been published, and appear in: Ollington, N., Green, V.A., & Sigafoos, J. (2010). Behavioural flexibility in children with autism. In P. Jose & J. Low (Eds.), *Contexts of Development, Lifespan Development: New Zealand Perspectives (2<sup>nd</sup> Ed)*, (167-175). Auckland:

(Frith, 1991, p 10). Asperger also drew attention to the sensory abnormalities often found in children with ASD, particularly touch, smell and taste (Blakemore et al., 2006), as well as unusual relationships with people and objects (Frith, 1991).

Considering Kanner and Asperger's accounts, Wing (1981) proposed the spectrum of autistic disorders that followed a triad of impairment: (a) communication; (b) socialisation; and (c) imagination, designating Asperger syndrome as a distinct disorder (Hippler & Klicpera, 2003). Since that time, there has been an increasing acceptance that the autism spectrum is wider than originally thought, with many individuals displaying characteristics that are in the borderlands of *DSM-IV-TR* (American Psychiatric Association, 2000) ASD criteria. This case is emphasised in Wing's (1997) categorisation of ASD according to social responsiveness (e.g. aloof, passive, active but odd, and loners).

Wing (1997) proposed a 'simple' system of subgrouping that was based on descriptions of the type of social impairment that an individual presented. Individuals in the 'aloof' group were defined as more closely fitting *DSM-IV-TR* (American Psychiatric Association, 2000) criteria for autism, and were described to be more commonly detached and indifferent in manner with moderate to mild learning disabilities. A lack of speech, or speech delays, motor stereotypies, a fascination with sensory stimuli, inappropriate eye gaze and lack of imaginative play also characterised this group. Individuals in the 'passive' group were those that tended to fit all three ASD categories, and could be identified by a passive interest in social interaction. This group of individuals were also usually less upset at interruptions to their routine than those in the 'aloof' group. In contrast, the 'active but odd' group tended to make more social approaches than the other two groups,

albeit often inappropriate, odd, naïve, one-sided, or repetitive. These individuals demonstrated a wide range of cognitive abilities and were suggested to be a good fit with the clinical description for Asperger syndrome. Wing's final group, the 'loners', were individuals that preferred to be left alone, often concerned only with their own interests. Individuals in this group tended to have fluent speech and have average to high levels of cognitive ability.

The increasing responsiveness to the perceptible overlapping features between autism, Asperger syndrome, and PDD-NOS is also indicated in recent research investigating the similarities and differences between the subtypes (see Macintosh & Dissanayake, 2004 for a review). The findings from such studies demonstrate that defining subtypes of ASD may not be that simple. There is also an increasing awareness that there are similar characteristics expressed in the families of individuals with ASD, as well as in typical development (Leekam et al., 2007).

### **Clinical Distinction**

Due to the apparent overlap in the defining characteristics of autism, Asperger syndrome, and PDD-NOS, a number of authors have begun to question the validity of these classifications (Macintosh & Dissanayake, 2004; Mandy & Skuse, 2008; Ozonoff et al., 2000; Snow & Lecavalier, 2011; Witwer & Lecavalier, 2008). The complexity of this matter is highlighted, in recent assessment studies that reveal overlaps between each of the subtypes in divergent ways.

Ozonoff, South and Miller (2000) investigated 35 children with PDD, and 27 typically developing controls. The children in the PDD sample (mean IQ =111) were divided into two groups based on *DSM-IV* criteria, parent interview using the *Autism*

*Diagnostic Interview – Revised* (ADI-R, Lord, Rutter, & Le Couteur, 1994), and direct observation using the *Autism Diagnostic Observation Schedule – Generic* (ADOS-G, Lord et al., 2000). Twenty-three children with HFA and 12 with Asperger syndrome were identified and matched for age, gender and IQ. Using a large battery of tests, only marginal characteristic differences between children with HFA and Asperger syndrome were identified, with more differences related to degree and severity. These findings suggest negligible differences in symptomology between children with HFA and Asperger syndrome.

Using the *Child Behaviour Checklist* (CBCL, Achenbach & Rescorla, 2001), the *ADOS* (ADOS, Lord et al., 1989) and cognitive assessment based on age and verbal skills, Snow and Lecavalier (2011) found no differences in pre-school children with autistic disorder and children with PDD-NOS. The results of this study suggest that symptomology for PDD-NOS may not be that different from autism, at least during childhood.

In a related study, Matson, Dempsey and Fodstad (2009) used the *Autism Spectrum Disorders-Diagnostic for Children* (ASD-DC, Matson & Gonzalez, 2007), a 40-item questionnaire measuring the different symptomatic behaviours of autism, Asperger syndrome and PDD-NOS. In this study, similarities and differences between the three groups were highlighted regarding both the qualitative characteristics and severity of symptoms. For example, the children with autism were significantly different to children with PDD-NOS and Asperger syndrome in the role of social relationships; however, children with PDD-NOS and Asperger syndrome were similar in the way of social relationships. For communication, children with autism were significantly different to children with Asperger

syndrome; however children with autism and PDD-NOS did not differ significantly. Regarding insistence on sameness and repetitive behaviour, the three groups did not differ significantly. Overall, while there were symptomatic similarities in differing areas for the three ASD subtypes, children with autism and PDD-NOS appeared to be the most similar, differing mostly in severity.

The findings regarding similarities between children with autism and children with PDD-NOS in Matson et al.'s (2009) study are similar to the findings of Snow and Lecavalier (2011) in terms of the domains of communication and RRBs, including insistence on sameness. These particular findings also appear to fit with the current diagnostic delineation of PDD-NOS such that symptoms for these individuals may be identified in fewer domains (Gotham et al., 2011). Then again, the corresponding findings for children with PDD-NOS and children with Asperger syndrome on social relationships suggests overlap between the three disorders. This overlap is also indicated in Ozonoff et al.'s (2000) study revealing negligible differences between children with Asperger syndrome and HFA.

### **The broader autism phenotype.**

Recent studies suggesting a 'broader autism phenotype', that is a qualitatively similar pattern of impairments in family members of individuals with an ASD, indicate that ASD may occur on a continuum of severity (see Rutter, 2011 for a review). Correspondingly, Dawson et al. (2007) reported a number of studies that show higher rates of autism traits in family members (parents and siblings) of individuals with autism. Also contributing to this theory is the evidence for a heritable component of ASD from a number of twin studies (see Dawson et al,

2007). For example, monozygotic twins appear to be more likely to each have an ASD diagnosis than dizygotic twins. Additionally, these authors report that sibling risk rates for autism (2.8 to 7.0%) are much higher than in the general population.

To this end, the DSM-V child and Adolescent Psychiatry Working Party recently adopted a single broad category view of ASD (Rutter, 2011). Though it appears that moving towards a paradigm based on a continuum is warranted, enquiries surrounding such a model may be complicated by relative IQ (Snow & Lecavalier, 2011), differing responses to treatment (Sigafoos, O'Reilly, & Lancioni, 2009) and stability/instability of diagnosis and core symptoms of the disorders over the lifespan, often modified by intervention (Matson et al., 2010). It would seem important then, to gain a deeper understanding of some of the possible mediating relationships of particular variables on core characteristics such as insistence on sameness. A further imperative is to identify treatments that may be modified in accordance with individual idiosyncrasies that may be susceptible to change over the life course.

Though an insistence to sameness and or resistance to change is especially relevant to ASD, it appears that to date, it is one of the least understood characteristics of the disorder, with limited treatment options available. The following section of this chapter will focus on an insistence on sameness and resistance to change and its delineation in current literature.

### **Insistence on Sameness and Resistance to Change**

Behavioural flexibility refers to the behaviours that accommodate the unpredictability of day-to-day living, as described by Wahlberg and Jordan (2001).

A lack of behavioural flexibility is indicated, in part, by an almost obsessive insistence on sameness and resistance to change. This can manifest in several types of behaviours and the form of manifestation may differ across individuals (Prior & MacMillan, 1973). Insistence on sameness and resistance to change are sometimes referred to as ‘sameness behaviour’ (Prior & MacMillan, 1973) and have also been described as indicating a lack of behavioural flexibility (Green et al., 2006; Wahlberg & Jordan, 2001). The current thesis will use these three terms interchangeably.

### **In autism spectrum disorder.**

A lack of behavioural flexibility is often observed in children with ASD (Attwood, 2006a; Baron, Lipsitt, & Goodwin, 2006; Bodfish, 2011; Green et al., 2008; 2007; 2006; Leekam, Prior, & Uljarevic, 2011; M. Lewis & Kim, 2009; Wahlberg & Jordan, 2001). Indeed, Kanner’s (1943) seminal paper detailed instances of insistence on sameness and resistance to change:

“Daily routine must be adhered to rigidly; any slightest change of the pattern called forth outbursts of panic....He wanted to make sure of the sameness of the environment literally by keeping doors and windows closed. When his mother opened the door ‘to pierce through his obsession’ he became violent in closing it again and finally, when again interfered with, burst helplessly into tears, utterly frustrated....He was extremely upset at seeing anything broken or incomplete (p. 238).”

Common examples of insistence on sameness and resistance to change include wanting to travel on the same route to school every day, or wanting to wear



the same clothes or eat the same foods. Other examples include a dislike of interruptions to a familiar routine, to unexpected interactions, or for things not being placed in a specific location. A lack of behavioural flexibility may also manifest itself as a desire to fix irregularities, a pathological fear of making a mistake, or the over-focus on the mistakes made by the self or others (Attwood, 2006b). To date there are a limited number of studies that have examined insistence on sameness and resistance to change in individuals with ASD (Bodfish, 2011).

***The context of insistence on sameness and resistance to change in ASD.***

Sameness behaviour is often captured under the umbrella terms of restricted and/or repetitive behaviours (Lewis & Bodfish, 1998). These terms include a range of behaviours, interests and activities such as repetitive motor behaviours (i.e. stereotypy or self-stimulatory behaviour), odd or seemingly uncontrolled movements and tics (i.e. dyskinesia), repetition of other's vocalisations (i.e. echolalia), seemingly uncontrollable vocalisations or gestures (i.e. perseveration), obsessions, compulsions, rituals, and self-injury. Turner (1999) separated restricted and/or repetitive behaviours into high-level behaviours (e.g., insistence on sameness and resistance to change, repetitive use of language and fixations on topics) from low-level behaviours (e.g., repetition of movement such as hand flapping and dyskinesia). Turner further suggested that lower level behaviours are associated with lower levels of function and cognitive ability compared to higher-level behaviours, which are associated with higher levels of function and cognitive abilities.

### ***Inflexibility as a function of ASD severity.***

Turner (1999) suggested that a lack of behavioural flexibility is a more complex or higher level behaviour in the spectrum of autistic symptoms and thus may be more prevalent in children with high functioning autism and Asperger syndrome. Few studies, however, have systematically explored if there are in fact any such differences. One possible explanation for the limited attention is that anecdotally, Asperger syndrome is often perceived as a milder and less debilitating form of autism. However, when considering the few studies carried out to date, it becomes evident that it may not be uncommon for children with HFA and Asperger syndrome to demonstrate high levels of inflexibility.

Cuccaro et al. (2003) carried out a factor analysis of 12 items from the *Autism Diagnostic Interview-Revised* (ADI-R, Lord et al., 1994), and the results lend some support to Turner's (1999) hypothesis. Cuccaro et al. found two factors that may be related to level of functioning in autism, measured using the *Vineland Adaptive Behavior Scales* (Vineland, Sparrow, Balla, & Cicchetti, 1984). These were repetitive sensory motor behaviours, suggested to be related to lower levels of functioning, and resistance to change, occurring in higher functioning individuals. According to Bodfish, Symons, Parker, and Lewis (2000), low-level behaviours have been identified in individuals with other developmental disabilities, and are suggested to serve the purpose of self-stimulation. On the other hand, Cuccaro et al. have suggested that insistence on sameness and resistance to change may form a coherent group representing a behavioural phenotype unique to ASD. This finding suggests that there may be some important benefits to gaining a deeper

understanding of insistence on sameness and resistance to change in terms of the identification of ASD and its subtypes.

In a similar study, Szatmari et al. (2006) investigated two factors derived from the *ADI-R* (Lord et al., 1994): 'Insistence on Sameness' and 'Repetitive Sensory and Motor Behaviours'. These authors found that individuals with Asperger syndrome scored significantly higher on questions related to the Insistence on Sameness factor than those with a diagnosis of autism, and vice-a-versa for the Repetitive Sensory and Motor Behaviours factor. These results suggest that individuals with Asperger syndrome may be more prone to react with frustration to change, and insist on sameness than individuals with autism.

A study by Ozonoff, South, and Miller (2000) compared the early history, current symptomology, and cognitive functioning of 23 children with HFA and 12 with Asperger syndrome. Children were matched for age and cognitive functioning (all demonstrated a full scale IQ > 85). Overall findings suggested that children with HFA and Asperger syndrome exhibit much the same symptomology, with differences occurring mainly in the degree or severity of those symptoms. For example, using the *Repetitive Behaviour Questionnaire* (RBQ, Turner, 1995), both groups (HFA and Asperger syndrome) were found to insist on sameness. However, a significant difference was found whereby the HFA participants revealed greater inflexibility than participants with Asperger syndrome. This finding suggests that children with HFA may be less flexible than children with Asperger syndrome.

Overall, these and other data suggest that a lack of behavioural flexibility not only appears to be more common in children with autism (Didden et al., 2008;

Greaves, Prince, Evans, & Charman, 2006; Green, et al., 2006; Honey, Leekam, Turner, & McConachie, 2007), but appears especially prevalent among those with HFA or Asperger syndrome. Green et al (2006), for example, investigated the nature and extent of behavioural flexibility in children with a reported primary diagnosis of autism, Asperger syndrome, and Down syndrome. Using the *Behavior Flexibility Rating Scale* (Green, et al., 2006), they found that individuals with Asperger syndrome showed the most problems with respect to inflexibility, followed by individuals with autism and Down syndrome. Prior and MacMillan (1973) reported a similar trend. For example, behavioural inflexibility was more of a problem among the autistic children in their sample of 32 developmentally delayed, or ‘psychotic’ children, of which those with speech displayed inflexible characteristics at a ‘higher developmental level’.

In another relevant comparison, Bartak and Rutter (1976) compared autistic individuals with IQs above 70 ( $n = 17$ ) versus below 70 ( $n = 19$ ). While children in both groups showed some stereotyped, ritualistic, or compulsive behaviour, the pattern differed between the two groups. Specifically, resistance to environmental change was significantly more apparent in the lower functioning group. Gabriels et al. (2005) revealed similar findings using the *Repetitive Behavior Scales-Revised* (RBS-R, Bodfish et al., 2000). In their study comparing 14 individuals with high non-verbal IQ ( $NVIQ \geq 97$ ) and low non-verbal IQ ( $NVIQ \leq 56$ ), Gabriels et al. found that the low NVIQ group showed significantly higher levels of sameness behaviour than the high NVIQ group. When placed together, these latter two findings would suggest that a lack of behavioural flexibility may be greater in lower functioning individuals.

The notion that a lack of behavioural flexibility may be greater in individuals with HFA is further confounded by the results of Militerni, Bravaccio, Falco, Fico, and Palermo (2002). For example, in their phenomenological study of repetitive behaviours in 121, 2-11 year-old children with ASD, Militerni et al. found that there were no differences in the frequency or duration of the 'need for sameness' or the 'need for routine' between children with HFA and LFA based on IQ (low <35, medium 36-70, and high >70). Behaviour was recorded historically using a semi-structured, non-standardised questionnaire derived from items relating specifically to repetitive behaviours in the *Yale-Brown Obsessive Compulsive Scale* (Y-BOCS, Goodman, et al., 1989), the *CARS* (Schopler, Reichler, & Rochen Renner, 1988), the *Aberrant Behavior Checklist* (ABC, Aman & Singh, 1994), and the *Stereotyped Behaviour Scale* (SBS, Rojahn, Tasse, & Sturmey, 1997) and through observation. It was suggested that the behaviours related to insistence on sameness and resistance to change in this study resembled those observed in other disorders such as obsessive compulsive disorder (OCD) and obsessive compulsive personality disorder (OCPD), albeit with a different quality.

There are some possible explanations for the differing results across studies. Firstly, most of these studies used differing instruments and procedures for identifying insistence on sameness and resistance to change. Also of note, each of the studies reported in this section has used differing methods when determining groups for comparison, thus weakening the comparison of the findings. This highlights an important challenge for future autism research.

### *Age related differences.*

It has been argued that higher-order behaviours, such as an insistence on sameness and resistance to change, may be more prevalent in older individuals with ASD (Rutter, 1978). It has also been suggested that children build up a repertoire of coping strategies as they mature (Baranek, David, Poe, Stone, & Watson, 2006; Green et al., 2008). Therefore, it is understandable that the effect of age on behavioural flexibility in individuals with ASD is still unclear (Turner, 1999).

Didden et al. (2008) investigated age effects of an insistence on sameness in individuals with autism, Angelman syndrome and non-specific intellectual disability. An age effect was apparent only in the Down syndrome group, such that younger children with Down syndrome (< 5 years of age) were more flexible in their behaviour than older age groups (6-11; 12-18; 19-25) respectively. It is important to note that Didden et al.'s sample did not include children with Asperger syndrome.

More recently, Richler, Huerta, Bishop, and Lord (2010) investigated differences in behaviours related to an insistence on sameness over time for children with autism and PDD-NOS. Children were evaluated using data from an insistence on sameness (IS) factor consisting of three items from the *ADI-R* (Lord et al., 1994) at ages three, five, and nine. It was found that as age increased, so did insistence on sameness scores, regardless of diagnosis. Measures of cognitive ability using the *Mullen Scales of Early Learning* (Mullen, 1995) and social/communicative impairments using the *Prelinguistic ADOS* (PL-ADOS, DiLavore, Lord, & Rutter, 1995) and the *ADOS* (ADOS, Lord et al., 1989) were also assessed over time. Cognitive ability was not found to be associated with insistence on sameness at age

two, or over time. However, they found that children with greater social/communication deficits at age two had lower IS scores than children with less severe social/communication impairment.

When placed together these findings suggest that insistence on sameness and resistance to change may become more evident in children as they grow older, and that this pattern may be more evident in children with less severe social/communication deficits irrespective of cognitive ability.

***Familial patterns of an insistence on sameness and resistance to change in ASD.***

Recently, a number of authors have found evidence for a possible heritable component of insistence on sameness and resistance to change in ASD (Cannon et al., 2010; Cuccaro et al., 2003; Lam, Bodfish, & Piven, 2008; Shao et al., 2003; Szatmari et al., 2006). For example, Szatmari et al. (2006) examined patterns associated with two main factors derived from parent interview on the ADI-R (Lord et al., 1994): Insistence on Sameness (IS) and repetitive Sensory and Motor Behaviours (RSMB). These authors found significant intra-class correlations (ICC) between sibling pairs with ASD for the IS factor ( $ICC = .27, p < 0.01$ ) but not the RSMB factor ( $p = 0.10$ ). Of note, this finding could also indicate that the environment shared by the children, including the parents' reaction to indications of insistence on sameness and/or resistance to change, may have shaped these similar behaviours in the children.

Still, similar results have been demonstrated by Cuccaro et al. (2003) and Lam et al. (2008). Cuccaro et al. identified two similar factors on the ADI-R (Lord

et al., 1994): Repetitive Motor Sensory Actions and Resistance to Change. These authors also found a stronger association for the resistance to change factor ( $ICC = .26$ ) in relation to the Repetitive Motor Sensory Actions factor ( $ICC = .12$ ), however these findings did not approach significance. Lam et al. found significant associations for two out of the three factors identified in their study. Significant associations were found for the Insistence on Sameness factor, ( $ICC = .33, p < 0.001$ ) and for the Circumscribed Interests factor of the *ADI-R* ( $ICC = .31, p < 0.001$ ), but not the Repetitive Motor Behaviours factor ( $p = 0.06$ ). These findings point towards insistence on sameness and resistance to change as a possible genetic indicator for ASD. However, before making such an assumption it would first be important to separate familial influences on behaviours such as insistence on sameness and resistance to change from any aspect that may be inherited.

Shao et al. (2003) examined multiplex families; that is families containing more than one child with a diagnosis of ASD, with high scores on an insistence on sameness factor derived from principal components analysis of *ADI-R* (Lord et al., 1994) data. The study was carried out in order to substantiate evidence for a particular chromosomal area with a susceptibility gene for autism. Measurements on the two factors derived for investigation: insistence on sameness, and repetitive sensory and motor behaviours and interests exposed increased evidence for linkage for autism in the 15q11 – q13 region associated with the insistence on sameness factor but not the repetitive sensory and motor behaviours and interests factor. Shao et al. note that their findings may be explained by the insistence on sameness factor reflecting a phenomenon found in individuals with Prader-Willi syndrome, that is compulsive-like behaviour, for which the disease loci occurs in the same region.



In another linkage study using insistence on sameness and repetitive sensory motor actions derivatives of the *ADI-R* (Lord et al., 1994), Cannon et al. (2010) found a significant signal for insistence on sameness in the 2q37.1 - q37.3 region. However, the same was not found for repetitive sensory motor actions, indicating the possibility that this region is also relatively specific to insistence on sameness. These authors also cite similarities in their findings to regions identifying susceptibility for obsessive compulsive disorder (OCD) in previous studies (Hanna et al., 2002).

In a related study, Abramson (2005) investigated the relationship between restricted and repetitive behaviours in autism and compulsive-like behaviours in parents. It was found that individuals whose parents scored highly on the *Yale-Brown Obsessive Compulsive Scale* (Y-BOCS, W. K. Goodman et al., 1989), a self-report measure of obsessive compulsive symptoms, had higher scores on the insistence on sameness factor derived from *ADI-R* (Lord et al., 1994) scores.

When placed together these findings not only reveal that insistence on sameness and resistance to change may be present at birth, but they may be part of a broader autism phenotype of compulsive-like behaviour (Cannon et al., 2010). This brings to light the importance of a deeper understanding of the behaviour in the context of assessment and differential diagnosis.

### **In other developmental disorders.**

A lack of behavioural flexibility has also been observed in children with various types of disorders (Didden et al., 2008; Turner, 1999) including Down syndrome (Evans & Gray, 2000; V A Green et al., 2006), Prader-Willi syndrome (Clarke et al., 2002; Wigren & Hansen, 2005; Woodcock, Oliver, & Humphreys,

2009), Fragile-X syndrome (Woodcock et al., 2009) and obsessive compulsive disorder (Zandt et al., 2007). Despite this, studies that have considered the differences in behavioural flexibility between the above populations and children with ASD, for which the behaviour is a defining characteristic, are in short supply.

### **Comparison with other disorders.**

To date there appear to be only three studies that have investigated the nature and prevalence of insistence on sameness and resistance to change in children with ASD as compared to other developmental disorders. Green et al. (2006) compared scores on the *Behavioural Flexibility Rating Scale (BFRS)* for children with autism, Asperger syndrome and Down syndrome. The study found that children with autism and Asperger syndrome were less flexible than children with Down syndrome; however children with Asperger syndrome were the least flexible of the entire sample.

In a similar study, Didden et al. (2008) used 11 items from the Dutch version of the *Behavioural Flexibility Rating Scale-Revised (BFRS-R, Green et al., 2007)* that correspond to the 11 original items in the *BFRS* (Green et al., 2006) to investigate the behaviour in children with Angelman syndrome, and a comparison group with non-specific intellectual disability. Data from the children with autism and Down syndrome from Green et al. (2006) were combined with Didden et al., revealing that the children with autism were the least flexible. It was also found that the children with Angelman syndrome had similar levels of flexibility to the group with Down syndrome from Green et al.'s sample.

Prior and MacMillan (1973) investigated sameness behaviour in 32 children aged between three and 11 years. Based on *Rimland's Check List E-2* (Rimland, 1971), 10 participants met criteria for autism, 18 were non-autistic, and four were 'doubtful' - although, in these latter two groups many had received a diagnosis of autism, and most displayed autistic or 'psychotic' features, and/or developmental delay. The 10 autistic children and four 'doubtful' children (whose scores were just below the cut-off point on *Rimland's E-2*) demonstrated higher sameness scores than the control group of 'non-autistic' children.

From these three studies, it would appear that insistence on sameness and resistance to change may be more common in individuals with ASD than other developmental disorders. However, more research is needed in order to verify this. Such research not only demands a focus on comparisons of a lack of behavioural flexibility with other developmental disorders and typical development, but could be improved by including more robust measures of the behaviour, alongside clear criteria for group assignment using standardised measures that relate specifically to the type of disorder. While this latter criterion may be difficult in terms of rare disorders, it may be more relevant to other, more common types of disorder.

### ***Comparison with obsessive compulsive disorder (OCD).***

Given that compulsive behaviour is a core symptom of both obsessive compulsive disorder (OCD) and ASD (Zandt et al., 2007) there has been some interest in comparisons between these groups. Recently, Ruta, Mugno, D'Arrigo, Vitiello, and Mazzone (2010) examined the features of obsessive compulsive behaviours using the *Children's Yale-Brown Obsessive Compulsive Scale* (CY-

BOCS, Scahill et al., 1997) in sixty individuals aged 8-15 with Asperger syndrome, OCD, and typical controls. It was found that the children with Asperger syndrome showed more hoarding and ordering behaviours than both typical controls and children with OCD, however the differences were only found to be significant between the typically developing and Asperger groups. It was also found that for children with Asperger syndrome significantly greater frequencies of repeating behaviours were reported than the typically developing group.

Zandt et al. (2007) compared scores on the *RBQ* (Turner, 1995) and the *CY-BOCS* (Scahill et al., 1997) for 54 children and adolescents with OCD, ASD, and typical development. Though no significant differences were found for sameness behaviour on the *RBQ* between children with OCD and children with ASD, higher rates of the behaviour were displayed in the younger children with OCD than older children with OCD, suggesting that it may become less prevalent with age for this group. In contrast, no significant age effects were found for the ASD group. It was found that the children with OCD had more problems related to rituals and routines and more compulsive behaviours than children with ASD, though rates for these behaviours were higher in the ASD group than in the typical controls. The obsessions and compulsions in children with ASD also appeared to be less sophisticated than those of the children with OCD, and perhaps are more comparable to those of young typically developing children, who have also been documented to insist on sameness and resist change during the early years of life (Evans et al., 1997).

### **In typical development.**

It has been observed that many typically developing children insist on sameness and resist change, at least during the early years (Arnott et al., 2010; Evans & Gray, 2000; Evans et al., 1997; Ghanizadeh & Moeini, 2011; Glenn et al., 2012; Honey et al., 2007; Leekam et al., 2007). Evans et al. (1997) investigated compulsive-like behaviour in typically developing children up to six years of age using the *Childhood Routines Inventory (CRI)*. Items on the scale relate to repetition, attachments, routines, orderliness, sensitivity and hoarding behaviours. Their data showed that children between 2-4 years of age displayed more behaviours associated with maintaining sameness and things being 'just right' in their environment than both their younger and older peers.

Leekam et al. (2007) encountered sameness behaviours in the two year-old children in their study using the *Repetitive Behaviour Questionnaire-2 (RBQ-2)*. The *RBQ-2* is a 20 item scale with items measuring repetitive actions, special interests, and insistence on sameness, that are known to occur in children with ASD and in typical development. Data obtained from 679 parents revealed a four factor structure for the questionnaire that is almost parallel to the classification systems of RRB's in ASD. This four factor structure included (a) repetitive motor movements, (b) rigidity/adherence to routine, (c) preoccupations with restricted patterns of interest, and (d) unusual sensory interests. Notably, some items in the sensory interests group of items overlapped with the adherence to routine and restricted patterns of interest group of items.

Like Evans et al., (1997), Arnott et al. (2010) demonstrated that sameness behaviours are less likely to be evident in typically developing children prior to the age of two. Arnott et al. used the *RBQ-2* (Leekam et al., 2007) to assess the frequency of repetitive behaviours in young typically developing children 15 months of age. More than 70% of parents completing the questionnaire endorsed the following behaviours to occur never or rarely: insist on things/daily routine remaining the same, upset about minor changes to objects, insist on doing things in a certain way/just right behaviours, insist on wearing the same clothes/eating the same foods. When placed together Evans et al. (1997) and Arnott et al.'s findings suggest that these behaviours are more likely to occur in typically developing children later in development, at least after the age of two.

Evans and Gray (2000), compared children with Down syndrome and typical developing children matched for mental age. It was found that the children with a mental age less than five years in both groups demonstrated more compulsive behaviours and insistence on sameness than children with a mental age greater than five, however, the severity, intensity and frequency of these behaviours was greater for the Down syndrome group. Still, the two groups followed a similar age trajectory, where the frequency and intensity lessened with increases in age. While there was no association between adaptive behaviour and compulsive behaviour for the younger children (< 5) in both groups, significant correlations were found for just right behaviours and the Socialisation and Communication domains of the *Vineland Adaptive Behavior Scales Screener* (Sparrow, Carter, & Cicchetti, 1993) for the older children (> 5) in the typically developing group. In contrast, maladaptive behaviours (withdrawal, depression, anxiety) were found to be significantly

correlated to the frequency and intensity of compulsive behaviour in the Down syndrome group. Maladaptive behaviours were not found to be related to compulsive behaviour in the typically developing group.

In a recent study, Ghanizadeh and Moeini (2011) investigated restricted and repetitive behaviours in pre-school children aged between three and a half and seven years using the *Repetitive and Restricted Behavior Scale* (RRBS, Bourreau, Roux, Gomot, Bonnet-Brilhault, & Barthelemy, 2009). It was found that mean scores for the reaction to change subscale were higher for both boys and girls than the other three scales of the *RRBS* respectively. Ghanizadeh and Moeini also compared subscale scores with measures of social, emotional and behavioural functioning on the *Strengths and Difficulties Questionnaire* (SDQ, R. Goodman, 2001) and found statistically significant associations between the reaction to change subscale of the *RRBS* and the 5 subscales of the *SDQ*: pro-social, peer, hyperactivity, conduct and emotional problems.

More recently, using the *CRI* (Evans et al., 1997), Glenn et al. (2012) observed compulsive-like behaviours in children from 2-11 years of age. The authors described a three factor fit for the *CRI*, ‘just right’, ‘repetitive behaviours’, and ‘sensitivity to the environment’ (e.g. sensitivity to clothing). In this study, though “just right” and “routinised” behaviours reduced significantly with age, they were nonetheless still observed in some children up to 11 years of age. Sensitivity to the environment did not decline with age. The authors concluded that the just right and repetitive behaviours appear to reflect an adaptive function prior to seven years of age, but in the older children high *CRI* scores may reflect pathology.

When considering these findings, it becomes evident that investigations into sameness behaviour in typical development may help us to clarify the behaviour in ASD. For example, in typically developing children insistence on sameness and resistance to change may be more readily observed as a “just right” behaviour between the ages of two and seven years, possibly reflecting the compulsive-like behaviours often observed in OCD (Zandt et al., 2007). It also appears that for typically developing children these behaviours are more likely to decrease in intensity and severity with age, perhaps reflecting an adaptive function during the younger years (Glenn et al., 2012). In contrast, in light of a possible heritable component (Cannon et al., 2010; Cuccaro et al., 2003; Lam et al., 2008; Shao et al., 2003; Szatmari et al., 2006), perhaps these behaviours may be imperceptibly evident from birth in children with ASD. Insistence on sameness and resistance to change also appears to become more noticeable with age in children with ASD (Richler et al., 2010), and may be more complex (Turner, 1999), in contrast to typically developing children.

### **Comparisons between autism spectrum disorder and typical development.**

Examinations of the differences in this behaviour between ASD and typical development are scarce. One such example is a study by Richler, Bishop, Kleinke, and Lord (2007). Their study examined restricted and repetitive behaviours in two year-olds with ASD, other developmental disabilities and typical development using three items from the *ADI-R* (Lord et al., 1994). It was found that the ASD and typically developing groups did not differ on insistence on sameness. This result may reflect findings from previous studies indicating increases in insistence on sameness



in ASD with age (Richler et al., 2010), and fewer repetitive behaviours in typically developing children prior to the age of two (Arnott et al., 2010). Additional work with older children is necessary to isolate the possible differences between children with ASD and typically developing children.

### ***Importance of comparison studies.***

Although insistence on sameness has been observed in typically developing children, this inflexibility appears to be much more transient than it is for children with autism (Evans et al., 1997). According to Green et al. (2008) this change could reflect the fact that typically developing children are more likely to acquire appropriate social, emotional, and cognitive skills that may assist them in tolerating and coping with changes in the environment. Winter and Schreibman (2002) have suggested that while there may be parallels in the developmental progression of sameness behaviour for children with ASD and typical development, it may eventually serve different functions for children with ASD.

Usually transient behaviour in typically developing children would not warrant detailed investigation. However, it seems that in order to understand this phenomenon in children with ASD, a closer look at these behaviours in typically developing children including comparisons with children with ASD, could help increase the understanding of this behaviour in the latter group.

### **Conceptualisation of Behavioural Inflexibility**

Several different conceptualisations on why insistence on sameness and resistance to change are seen in children with autism have been proposed (Green et

al., 2008; Happe & Frith, 2006; Kootz, Marinelli, & Cohen, 1982; Turner, 1997; Wahlberg & Jordan, 2001). It is beyond the scope of this thesis to provide a detailed account of each and every explanation of the behaviour. Therefore the discussion will be limited to those that are able to provide some valuable insight towards the studies of insistence on sameness and resistance to change described within this thesis. For further discussion of the various conceptualisations and explanations of behavioural inflexibility please refer to Green et al.'s (2007) review of theory, assessment and intervention. The following discussion includes theories based on a systems approach, executive function deficits, and the construction of internal schema, adaptive function deficits and sensory processing abnormalities.

Wahlberg and Jordan (2001) suggested that children with autism seek to avoid unpredictably because they cannot cope with as much complexity as typically developing children. These authors suggest that individuals with autism have a unique relationship with the environment that is focused on maintaining sameness to enable the preservation of a system that can avoid the unpredictability of the changes that occur in everyday life. It has also been suggested that a lack of behavioural flexibility may be associated with impairments in executive functioning (Turner, 1997), that is, in the ability to plan behaviour and behave appropriately, but also to inhibit inappropriate actions. It is proposed that children with impaired executive function find it difficult to cope with environmental changes.

As children develop, they begin to organise their behaviour and thought to enable them to adapt to the environment. These organised patterns of thought and behaviour have been referred to by Piaget (Ginsburg & Opper, 1988) as a *scheme*. Kootz, Marinelli, and Cohen (1982) suggest that, in contrast to the typically

developing child, who is able to adapt to change, children with autism fail to construct new internal schema that would enable them to familiarise themselves with new situations. Consequently, these children often develop alternative behaviours to cope with the situation, such as self-stimulatory behaviour (i.e. flicking fingers in front of the eyes) and/or insistence on sameness and resistance to change (i.e. insisting that furniture remain in the same place).

Adaptive behaviour is related to developmental age, and can be defined by the extent to which an individual is able to behave independently in day-to-day situations in relation to communication, socialisation, daily living and motor skills (Kanne et al., 2010; Sparrow et al., 2005). Aspects of adaptive behaviour include, for example, listening and understanding, expression (speech and complex ideas), social (skills, coping, and interactions with others), self-help, safety, and play skills, controlling impulses, and expressing and recognising emotions (Sparrow et al., 2005).

It has been suggested that individuals with ASD may lack the adaptive coping mechanisms that their typically developing peers attain that help to protect themselves from anticipated stressors in their environment, and in turn respond with maladaptive coping strategies, such as problem behaviour (Baron et al., 2006). Along these lines, Green et al. (2008) considered the possibility that an inability to problem solve and tolerate change may produce behavioural inflexibility by default.

This assumption is related to adaptive behaviour and relative social immaturity. For example, children with autism seem to have great difficulty recognising and understanding the emotions of others, but they also seem to have

great difficulty in recognising and understanding their own emotions (Hill, Berthoz, & Frith, 2004). Such understanding and recognition are important for developing and maintaining social relationships (Blair, Denham, Kochanoff, & Whipple, 2004), but also often seen as prerequisites for achieving emotional control and self-regulation (Goleman, 1996).

### **Emotion regulation as an intermediary factor.**

The inability to control emotions has been associated with both over-control and under-control of emotional regulation; under-control causing aggressive behaviour and over-control leading to behavioural inhibition (Hessler & Katz, 2007). Kanne and Mazurek (2011), examined prevalence and risk factors for aggression in children with ASD and found that out of 1380 individuals, 56% were currently engaging in aggressive behaviour in one form or another (mild to severe) towards caregivers, and 32% towards non-caregivers. Importantly, also, Kanne et al. demonstrated with logistic regression that ritualistic behaviour ( $\beta = -.066, p < 0.05$ ) and sameness behaviour ( $\beta = 0.96, p < 0.001$ ) significantly predicted aggression in their sample of young children and adolescents with ASD.

It is possible then that an under-control of emotion regulation in some children with ASD may be at the root of a number of the problem behaviours observed as a reaction to the frustration associated with insistence on sameness and resistance to change. This may be particularly relevant to individuals with HFA. Previous reports indicate that children with HFA and Asperger syndrome exhibit a cognitive capacity that is discrepant with their level of adaptive functioning (Klin et al., 2007; Saulnier & Klin, 2007), and that this discrepancy may increase with age

(Klin et al., 2007; Szatmari, Bryson, Boyle, Streiner, & Duku, 2003). Klin et al. (2007) revealed deficits of between one and three standard deviations for communication and adaptive functioning, despite verbal IQ's in the normal range for 187 children with autism and Asperger syndrome. Moreover, Saulnier and Klin (2007) demonstrated that this discrepancy was the same for children with Asperger syndrome, despite less severity in autistic symptoms. Indeed, such an incongruity may cause a number of problems, especially for children with HFA and Asperger syndrome, as the child's relative cognitive capacity often sets up expectations for caregivers, teachers and peers that the child may be socially unable to meet.

### **Unusual sensory response as an intermediary factor.**

It is also possible that the frustration observed in response to changes in the environment may be a function of sensory sensitivity for some children with ASD. For example, many children with ASD exhibit unusual sensory responses to tactile, auditory, visual, and olfactory information (Nadon, Ehrmann-Feldman, Dunn, & Gisel, 2011; Rogers, Hepburn, & Wehner, 2003; Tomcheck & Dunn, 2007), as well as extreme sensory modulation (Ben-Sasson et al., 2007). Sensory modulation refers to the ability to respond adaptively to sensory input, and includes hyper-responsivity (sensory avoiding) and hypo-responsivity (sensory seeking) (Ben-Sasson et al., 2007). These unusual sensory responses occur in approximately 70% of ASD cases (Baranek et al., 2006).

A number of researchers have found associations with restricted and repetitive behaviours (RRBs) and the sensory sensitivities often observed in children with autism (Boyd et al., 2010; Boyd, McBee, Holtzclaw, Baranek, & Bodfish, 2009;

Gabriels et al., 2008). For example, Gabriels et al. (2008) examined the relationship between RRBs and sensory responses in 70 children with ASD. Using the *Repetitive Behavior Scale-Revised* (RBS-R, Lam & Aman, 2007) and the *Sensory Profile* (Dunn, 1999), and controlling for age and IQ, these authors demonstrated not only a significant relationship between repetitive behaviours and abnormal sensory responses, but also the possibility that there may be an ASD subgroup for which this relationship exists regardless of age and IQ. In a similar study, Boyd et al. (2009) investigated the relationship between RRBs and atypical sensory responses in school aged children with high functioning autism, using the *Sensory Questionnaire* (SQ, Boyd & Baranek, 2005) and the *RBS-R*. It was found that sensory abnormalities were associated with stereotypies and compulsions.

It is therefore conceivable that sensory sensitivity may play an important part in the inflexible behaviour demonstrated by a number of children with ASD. Indeed, it may also play a part for children without ASD. For example, the need for things to be “just right” as well as food selectivity appear to be influencing factors for both children with ASD and typically developing children (Cermak, Curtin, & Bandini, 2010; Evans & Gray, 2000). It is also possible that these behaviours reflect a preferred sensory perceptual experience for the child (Evans & Gray, 2000; Lovaas, Newsom, & Hickman, 1987; Smith-Myles et al., 2004), for example the feeling of particular fabrics against the skin, or the taste, texture or odour of particular foods (Nadon et al., 2011).

Dickie, Baranek, Schultz, Watson, and McComish (2009), qualitatively investigated the sensory experiences of 37 preschool children with autism, and 29 typically developing pre-schoolers. It was found that various sound experiences were

discomforting for 28% of typically developing children compared to 59% of children with autism, most of which were loud and unexpected sounds. Positive experiences with touch were reported for 24-29% of children in both groups, with only six children reporting touch, mostly involving the head and face, as a negative experience (4 with autism, and 2 typically developing). Issues associated with food were related to taste, smell, texture, and visual aspects of the food. Negative experiences were reported for 17% of the typically developing children and 30% of the children with autism. In contrast, food experiences were positive for 24% of typically developing children and 5% with autism.

Smith-Myles et al. (2004) examined differences in sensory responses in 86 children with Asperger syndrome and 86 children with autism matched for chronological age (between 6: 9 months and 16: 8 months) using the *Sensory Profile* (Dunn, 1999). It was found that the patterns in sensory processing in the two groups differed in areas such as psychosocial coping strategies, inattention/distractibility, sensory overload, touch processing and auditory processing, with children with Asperger syndrome being more challenged in these areas.

When placed together these findings suggest that that if indeed sensory processing has a mediating effect on insistence on sameness and resistance to change, it may be different for children with HFA as compared to LFA, and also different in typical development. Moreover, it may also depend on the context in which the sensory experience is occurring (i.e. pleasant or unpleasant sensory experience).

Each of these conceptual accounts expresses a behavioural deficit for the inflexible child. As the difficulty is related to behaviour, it implies that an intervention aimed at increasing adaptive alternatives might be an appropriate objective for future treatment research (Green et al., 2007). The following sections emphasise the importance of assessment and treatment strategies that aim to replace maladaptive strategies with adaptive strategies.

### **The Impact of Insistence on Sameness and Resistance to Change**

According to several researchers, a lack of behavioural flexibility is associated with, or indicated by, a propensity to react to environmental changes by engaging in problem behaviour, such as tantrums, aggression, and self-injurious behaviour (Brereton, Tonge, & Einfeld, 2006; Matson & Dempsey, 2009; McCracken et al., 2002; Sukhodolsky et al., 2008; Turner, 1999). It is possible that the unpredictability that arises from disruption and change to the environment causes frustration, stress and anxiety for some children with ASD (Rodgers, Glod, et al., 2012; Rodgers, Riby, Janes, Connolly, & McConachie, 2012; Sukhodolsky et al., 2008), which may in turn evoke problem behaviour.

#### **Problem behaviour.**

Problem behaviour has been defined as behaviours that are broadly maladaptive; that is antisocial, disruptive, or destructive (Reber, Allen, & Reber, 2009). The problem behaviour that is often associated with a lack of behavioural flexibility may take the form of aggression, tantrums, or self-injurious behaviour (Green et al., 2007; R. G. Smith, Vollmer, & St. Peter Pipkin, 2007). Aggression, for example, may take the form of hitting others (with the child's own hands or with



objects), or throwing items. Tantrums may range from mild to severe. During a mild tantrum for example, a child may whinge, whine, fuss, and stomp their feet. On the other hand, during a severe tantrum a child may scream and thrash about, or throw themselves or objects around. Self-injurious behaviour may involve scratching, biting, or hitting parts of the child's own body. The child may also hit or repeatedly scrape parts of their own body against furniture, or walls, and doors.

Problem behaviour has been argued to be a major concern in terms of adjustment to society for individuals with ASD (E. G. Carr, 2011). Frequent and severe problem behaviour can have a detrimental effect on the child's family, community and school life (Green et al., 2008), often interfering with the individuals' day-to-day functioning (Lounds-Taylor & Mailick Seltzer, 2010). Problem behaviour is one of the highest predictors of stress among parents of children with a developmental disability (Gabriels et al., 2005; Hartley et al., 2008; Kanne & Mazurek, 2011; Lecavalier, Leone, & Wiltz, 2006). There is also some evidence that it may limit opportunities for engagement in community based activities (Singh et al., 2011). At school, problem behaviour may impact the teacher's instructional capabilities (McCracken et al., 2002). Moreover, problem behaviour may impact the teacher indirectly. For example, the knowledge that there is the probability of problem behaviour arising from frustrating situations in the classroom could place pressure on a teacher to remain alert to possible stressors, or to be able to interpret the signs of stress in particular individuals (Janzen, Baron, & Groden, 2006). However, in a demanding classroom, this is not always possible.

It would appear from the available evidence that the problem behaviour often associated with insistence on sameness and resistance to change is a matter that

warrants attention. Indeed, there is some indication that an insistence on sameness may increase over time for a number of children with ASD (Richler et al., 2010), as discussed earlier. In many cases, the problem behaviours associated with an insistence on sameness and resistance to change persist into adult life (Billstedt et al., 2007; Chamak et al., 2008; Zandt et al., 2007). Bodfish (2011) emphasised the occurrence of many repetitive behaviours as ‘residual symptoms’ that persist well into adulthood even after social-communicative deficits improve. For these reasons it would seem very important to uncover appropriate methods for assessment and intervention to treat this aspect of ASD.

### **Intervention.**

Alongside the broad-spectrum therapies to reduce stress and anxiety for the child, such as anti-anxiety medication (Matson & Dempsey, 2009; Tsai, 2007), there are two main suggestions for behavioural intervention that have been made that are relevant to an insistence on sameness and resistance to change. These two approaches can be described as the accommodation approach and the problem solving/tolerance building approach. These two approaches are not mutually exclusive, and should be seen in terms of a continuum from complete accommodation of inflexible behaviour to a total focus on tolerance building or problem solving. For example, complete accommodation of the child’s inflexibility may be demonstrated by allowing the child to wear the same clothes every day. At the other end of the continuum, a total focus on tolerance building and problem solving may include teaching the child to change their clothes every day and reinforcing the child for participating in the training. It is possible that a combination

of both accommodation and education/tolerance building might be an effective intervention approach.

### ***Accommodation.***

The accommodation approach focuses on developing consistent routines for the child and reducing environmental change. The logic is to reduce the frustrations that may arise from change by reducing the amount of change impacting on the child. Alternatively, frustrations may be reduced by creating routines and pictorially depicted schedules that make the inevitable changes more predictable (Mesibov, Browder, & Kirkland, 2002; Mesibov & Shea, 2010). This method of structured teaching provides environments and activities that consider an individual's visual strengths and special interests (Mesibov & Shea, 2010). For example, the physical environment may be arranged in a manner that reduces sources of distraction or over-stimulation, and provides visual cues for movement around the room. The accommodation approach also considers the organisation and communication of a sequence of events.

One of the basic principles of the structured learning method is that activities are centred on predictability (Mesibov, Shea, & Schopler, 2004). Therefore the accommodation approach aims to emphasise a child's insistence on sameness and resistance to change in its teaching. For example, a child who insists on a set sequence for completing tasks would be taught skills with this rigidity as its framework, using schedules and step-by-step plans for activities. Another example might be to use a child's attachment to a particular item by using it to highlight

important aspects of the learning experience. Consequently, stress is minimised by the endorsement of the child's need for sameness.

This type of intervention can have positive results (Dooley, Wilczenzenski, & Torem, 2001; Mesibov et al., 2002; Mesibov et al., 2004). However there are limited examples related to situations involving insistence on sameness and resistance to change. One example, is a study by Dooley et al., (2001). Dooley et al. demonstrated that problem behaviour associated with transition between activities was reduced considerably for a three year-old boy via the use of a transition board. In this example, the child was taught to go to a schedule board and remove a picture attached with a Velcro strip, carry the picture to an activity with the same picture and place it in a nearby basket. While this example appears to be useful, more research is needed to verify the utility of the accommodation approach in the management and treatment of insistence on sameness and resistance to change. Moreover, this approach would perhaps seem best suited to settings where it is feasible to ensure consistency of routine and environment.

### ***Problem-solving/tolerance building.***

At the other end of the intervention continuum, the focus shifts to teaching the child to tolerate change. In addition, the child may need to learn specific problem-solving skills so as to be able to react proactively to change. An example of how this may be achieved is through teaching the child to ask for help, for example when an item that they are using malfunctions. This may be achieved, for example through functional communication training in which a child is taught to use a communicative strategy as a functional alternative to problem behaviour (Singh et

al., 2011). A number of studies have demonstrated reductions in problem behaviours in children with autism (Sigafoos & Meikle, 1996) and other developmental disabilities (Durand, 1999) following functional communication training. However, investigations into the reduction of problem behaviour associated with insistence on sameness and resistance to change via functional communication training to teach tolerance for frustration and problem-solving are yet to be explored.

Nevertheless, there is some emerging evidence to support the use of these types of learning-based procedures for the treatment of problem behaviours in children with autism (Matson & Dempsey, 2009). For example, Roberts-Pennell and Sigafoos (1999) used a multiple baseline design to teach three-year old children with limited communication skills to request more play using the behaviour chain interruption strategy (BCIS). In this study, three children were taught to request the continuation of play following a disruption to an ongoing activity brought about by the researcher. For example, while listening to music, the volume was turned down, or the device was turned off. This interruption was targeted to occur when enjoyment appeared to be at its peak. Children were prompted to request for continuation of the activity, e.g. 'more', with an increasing delay between the delivery of prompts. Children were provided with social praise and the routine was reinstated when correct attempts were made. All three children demonstrated an increase in correct requests for more play, with two of the three children demonstrating maintenance of these skills as well as generalisation to another activity.

Sigafoos, Couzens, Pennell, Shaw, and Dudfield (1995) used functional communication training to teach three children with developmental disabilities to request help to find missing items that were preferred and frequently used in existing

leisure activities. Children were engaged in a usual activity in which items were needed in order to continue with the activity. Two studies were implemented to teach children to discriminate between missing items and their matching objects. In the first study, two out of three 4-6 year olds were successfully taught to discriminate the missing object from a matching pair from four photographs (the two objects required for the activity and two distractor objects) in a communication book. In the second study, four photographs were provided (three objects required to carry out a painting activity: brush, paints, paper) and a distractor item. Two children aged six and seven were taught to request the missing item, discriminating between what was needed and what they already had to carry out the activity. Discrimination was maintained for these four children at follow-up (7 weeks from the final session). These findings suggest that this type of functional communication training may be helpful in teaching children to request missing objects. Also, when combining these results with those found by Roberts-Pennell and Sigafoos (1999), it would seem that functional communication based training may be useful for teaching children to request permission to continue with an activity when it comes to an abrupt end. These types of strategies may be particularly useful in terms of reducing the frustration for children that insist on sameness and resist change (Green, et al., 2008).

Treatment approaches that aim to substitute maladaptive responses with adaptive behavioural responses may also be important in terms of quality of life for many ASD individuals. Bodfish (2011), suggested that treatments aimed at increasing an individual's flexibility and adaptability may lead to improvements in that persons overall trajectory of adaptive behaviour, development, and functioning.

While accommodation, tolerance building and problem solving interventions appear promising, there is currently little empirical evidence to support these treatment recommendations. In order to enhance this area of research, it would seem important to identify appropriate assessment procedures to inform such treatment.

### **The Assessment of Behavioural Flexibility**

As described in in the previous section, insistence on sameness and resistance to change are aspects of ASD that have been relatively less researched than other areas of the disorder. There are also limited assessments and intervention techniques focussing on these aspects of the child's behaviour. As such, it seems pertinent that researchers follow a line of investigation that includes the examination of suitable assessments of the behaviour. This is important for a number of reasons. Firstly, as described in the above section, it would assist with the identification of suitable assessment strategies to manage the behaviour. Secondly, as described earlier in this chapter, researchers face new challenges in determining symptom severity in order to differentiate ASD subtypes. Thirdly, these objectives serve the additional function of decreasing delays in treatment, as well as assisting families in gaining access to services. For children with Asperger syndrome, this would seem particularly important, as currently the diagnosis of this particular subtype of ASD most often occurs much later in development (Attwood, 2006a).

#### **Available methods.**

Assessment procedures to identify an insistence on sameness and resistance to change are typically included as part of a broad assessment of the characteristics of autism. There are few measures available that solely focus on inflexible

behaviour. Assessments that consider a lack of behavioural flexibility within the context of clinical interview or observation often include the behaviour as part of a subtest measuring restricted and repetitive behaviours. These often contain few criteria for measuring maintenance of sameness. Two such examples are; the *Autism Diagnostic Interview-Revised* (ADI-R, Lord et al., 1994), and the *Autism Diagnostic Observation Schedule* (ADOS, Gotham, Risi, Pickles, & Lord, 2007). Although these assessments are considered ‘gold standard’ in terms of diagnosis, their treatment of behavioural flexibility is too broad to adequately inform intervention.

There are a small number of more specific rating scales that may be used to assess aspects of behavioural flexibility, however these scales are focussed mainly on repetitive or compulsive like behaviours, and as such also include insistence on sameness and resistance to change as subsets of a larger picture, that is restricted and repetitive behaviours. Responses to items within these scales are often based on whether the behaviour has ever been observed and how frequently it is observed, or the severity of the behaviour as a problem for the individual.

The most recent example is the *Repetitive Behavior Questionnaire-Revised* (RBQ-2, Leekam et al., 2007). The RBQ-2 was developed using two existing measures: the *Repetitive Behaviour Questionnaire* (RBQ, Turner, 1995) and the *Diagnostic Interview for Social and Communication Disorders* (DISCO, Wing, Leekam, Libby, Gould, & Larcombe, 2002). The 20 item scale includes seven items that relate to an insistence on sameness and resistance to change. Items relate to wanting things to remain the same, for example daily routines and household items, and insisting on doing things the same way, for example watching the same video over and over, wearing the same clothes and eating the same foods.



Further examples include the *Repetitive Behavior Scale-Revised* (RBS-R, Bodfish et al., 2000), the *Restricted and Repetitive Behaviour Scale* (RRB, Bourreau et al., 2009) and the *Childhood Routines Inventory* (CRI, Evans et al., 1997). The *CRI* (Evans et al., 1997) is a 19-item questionnaire that was designed to reflect DSM-IV (American Psychiatric Association, 2000) compulsive-like behaviour. Questions on the *CRI*, for example surround children's routines, preferences and desire for order. The *RRB* (Bourreau et al., 2009) is a 33-item scale which contains five items related to ritualistic behaviour and two items related to reaction to change. The *RBS-R* (Bodfish et al., 2000) was amended from its original form to include adapted items from the *CRI* (Evans et al., 1997), the *ADI-R* (Lord et al., 1994), and the *Sameness Questionnaire* (Prior & MacMillan, 1973). Eleven items on this scale surrounding sameness behaviour included wanting to do things a certain way, insistence on routines and difficulties with new situations.

Lam and Aman (2007) devised a five factor scale solution for the *RBS-R* (Bodfish et al., 2000), which included 12 items related to ritualistic and sameness behaviour collapsed under the one heading. This five factor *RBS-R* was found to be more appropriate for Lam and Aman's larger sample of 307, compared to the 124 participants included in Bodfish et al.'s (2000) study. Though these scales incorporate a more substantial consideration of sameness behaviours than the *ADI-R* (Lord et al., 1994) and the *ADOS* (Gotham et al., 2007) they nevertheless remain limited to a relatively small threshold of questions related to a lack of behavioural flexibility, or as in the *CRI* (Evans et al., 1997), are more related to compulsive-like behaviours.

The most comprehensive methods of assessing an insistence on sameness and resistance to change to date have been provided by the *Sameness Questionnaire* (Prior & MacMillan, 1973) and the *Behavior Flexibility Rating Scale* (BFRS, Green, et al., 2006) and *Behavioural Flexibility Rating Scale -Revised* (BFRS-R, Green, et al., 2007). Prior and Macmillan (1973) developed the 28-item *Sameness Questionnaire* in an attempt to differentiate the characteristics of sameness behaviour in autistic individuals and children with ‘other disturbances’ and to enhance the differential diagnosis of autism. In this assessment, parents or caregivers are asked to rate the extent to which a particular behaviour is present. Green et al. (2007; 2006) developed the *BFRS* and the *BFRS-R* to identify situations in which children insist on sameness or resist change. The *BFRS-R* contains 16 items to which caregivers are asked to rate the extent to which a situation becomes a problem for the individual. Though the *Sameness Questionnaire* and the *BFRS-R* include a considerable number of items related to an insistence on sameness and resistance to change, they have not featured prominently within the research literature. Moreover, despite the common incidence of an insistence on sameness and resistance to change in individuals with ASD and the important need for valid and reliable assessments that may facilitate intervention, there have been few studies to verify these instruments.

The results of Prior and MacMillan’s (1973) study utilising the *Sameness Questionnaire* are often referred to within discussions surrounding ‘higher-level’ restricted and repetitive behaviours (Bodfish et al., 2000; M. H. Lewis & Bodfish, 1998; Turner, 1999), however there appears to be only one other study to date that has utilised this questionnaire in order to observe the extent of sameness behaviour in individuals (Green et al., 2008). In Green et al.’s (2008) study, the *Sameness*

*Questionnaire* was used to provide supplementary information to scores indicated on the *Behavioural Flexibility Rating Scale-Revised* (BFRS-R, Green et al., 2007), and showed consistent results across these instruments. Given the paucity of research investigating the nature, assessment, and treatment of insistence on sameness and resistance to change over the years (Bodfish, 2011; Boyd et al., 2011; Green et al., 2006), and a focus towards core symptoms of ASD, and thus RRBs in general (Cuccaro et al., 2003; Leekam et al., 2011; Militeri et al., 2002; Richler et al., 2007; Zandt et al., 2007), it is possible that the *Sameness Questionnaire* has been overlooked in favour of other scales that explore the wider range of restricted and repetitive behaviours observed in ASD.

To date it seems that the *BFRS-R* (Green, et al., 2007) may hold the most promise as a tool to inform intervention. Though Green et al. (2008) identified some limitations to the scale; preliminary studies suggest that the *BFRS* and *BFRS-R* appear to have adequate psychometric properties for their intended purpose (Didden, et al., 2008; Green, et al., 2008; 2007). According to Green et al., responses on the *BFRS-R* are restricted to the 16 situations listed. They are also limited by opportunities for the caregiver filling out the questionnaire to witness the specific situations occurring for the individual. Nevertheless, the *BFRS* (Green, et al., 2006) has shown good discriminant validity on comparisons with children with Down syndrome (Green, et al., 2006; Didden, et al., 2008) and Angelman syndrome (Didden, et al., 2008). As yet no comparison has been made with typically developing individuals.

In terms of validity, Green et al. (2008) compared *BFRS-R* (Green, et al., 2007) scores with the results of a play-based assessment. In the play-based

assessment, 16 frustration scenarios were created to match the 16 items on the *BFRS-R*. For example, the child was given a preferred toy/game with a part missing to create a situation where flexibility was required. Four children aged from 3-13 with a primary diagnosis of autism and Asperger syndrome participated in the play-based assessment. Children were each assessed for their problem solving ability and tolerance for change under situations that were shown to cause the greatest frustration for them based on parent report on the *BFRS-R*. Children were observed during play and snack situations, and instances of appropriate behaviour; problem solving and aberrant behaviour were noted, firstly during problem-free play sessions and secondly in play sessions following the manipulation of frustration scenarios. During problem-free sessions play continued without disturbance. During manipulated sessions, while playing with a preferred toy, for example, the toy would malfunction or appear broken.

The results of this preliminary study provided some evidence that children with autism experience difficulties coping with the frustration scenarios assessed in the *BFRS-R* (Green, et al., 2007). It was also noted that the children showed a general deficiency in their problem solving skills across a number of the scenarios. Green et al. (2008) suggested that these problem situations could thus become logical contexts for intervention to improve problem-solving skills and increase the children's tolerance for change, and therefore increase behavioural flexibility.

Though the *Sameness Questionnaire* (Prior & MacMillan, 1973) appears useful for determining incidences of sameness behaviour, the *BFRS-R* (Green, et al., 2007) appears to be promising as tool for identifying situations that pose a problem for individuals with ASD that can be used to inform the type of intervention that

aims to teach appropriate ways of responding to problem situations. However, while Green et al.'s (2008) protocol appears promising for identifying antecedent conditions that set the occasion for insisting on sameness or resisting change, the protocol was limited in that it did not include any assessment of the motivational consequences, if any, that might have been maintaining the problem behaviour that is associated with an insistence on sameness and resistance to change. For example, a functional assessment of the behaviour is a widely held approach aimed at identifying the motivational consequences of behaviour (E. G. Carr, 1994; J. E. Carr & LeBlanc, 2003; Hanley, Iwata, & McCord, 2003; Iwata & Worsdell, 2005; O'Reilly et al., 2010).

### **Functional Assessment**

Commonly, treatment approaches aimed at increasing appropriate behaviour in children with autism and other developmental disabilities are based on the principals of applied behaviour analysis (Singh et al., 2011). Such treatment approaches are recognised to be more effective if they are carried out following a functional assessment of the behaviour in question (Didden, Duker, & Korzilius, 1997; Herzinger & Campbell, 2007; Horner et al., 2005; Love, Carr, & LeBlanc, 2009).

### **Background to functional assessment.**

The development of procedures to assess the function of problem behaviour originated in the work of E. G. Carr (1977), where a number of functions were observed following the expression of severe problem behaviour. Following on from this work, Iwata et al. (1982/1994) developed an experimental procedure that was

used to determine whether self-injury was maintained by specific operant functions using four conditions; social, alone, demand and play. These two seminal papers lead the way for a function-based model for the selection of treatments that allow for the identification of replacement behaviours that serve the same function as the maladaptive behaviour. This method has successfully replaced less ideal strategies such as ignoring the behaviour, or relying on aversive procedures (J. E. Carr & LeBlanc, 2003).

***The functional analysis procedure.***

Within the applied behaviour analytic theoretical framework, problem behaviours are conceptualised as learned responses that result from the individuals experience with their environment (Iwata & Worsdell, 2005). These responses are also conceptualised as operant responses that are shaped and maintained by contingencies of reinforcement (see Table 2.1). These contingencies may be arranged by others (social contingencies), or they may arise as a direct result of the behaviour (automatic contingencies). In order to establish the type/s of contingencies that may maintain an individual's behaviour, a functional assessment of the behaviour is performed.

Table 2.1

*Reinforcement Contingencies that Maintain Behaviour*

Reinforcement Contingency	Description	Example
Positive Reinforcers		
Social positive reinforcement	Behaviour maintained by social attention	Pat on the back; soothing words; reprimands
Automatic positive reinforcement	Behaviour maintained by sensory consequences	Sitting at the same place at the dining table; keeping things 'just right' in the environment; lining things up in rows
Negative Reinforcers		
social negative reinforcement	Behaviour maintained by the termination of an ongoing activity	Time out' consequences; not having to finish a task
Automatic negative reinforcement	Behaviour that directly terminates or attenuates ongoing stimulation	Scratching an insect bite; rubbing a sore spot

*Note.* Adapted from Iwata, B.A., & Worsdell, A.S. ( 2005). Implications of functional analysis methodology for the design of intervention programs. *Exceptionality*, 13 (1), 25-34.

***The importance of carrying out a functional assessment of behaviour.***

Function-based treatments have proven successful in reducing problem behaviour or increasing appropriate behaviour (Iwata, Vollmer, Zarcone, & Rodgers, 1993). For example, when problem behaviour can be linked to specific motivations for that behaviour, then the likelihood of successful treatment is increased (Iwata et al., 1982/1994). Researchers have also demonstrated that this type of assessment may be useful for the more prevalent disruptive behaviours, which occur within

regular classrooms (Broussard & Northup, 1995; Dufrene, Doggett, Henington, & Watson, 2007).

A functional assessment can inform clinicians and teachers who may be carrying out interventions to replace maladaptive behaviour with adaptive strategies in a number of ways. For example, information obtained in a functional analysis may address response-reinforcer contingencies rather than simply addressing the topography of behaviour alone (Love et al., 2009). It can also provide evidence to eliminate interventions which are irrelevant (Gresham, Watson, & Skinner, 2001), thus lessening the burden of expenses for parents, as well as lengthy visits with practitioners for children and their caregivers. This latter incentive for parents should be taken into consideration when selecting the type of functional assessment procedure to be implemented.

Though there are a variety of functional assessment procedures that can be used to examine the motivation of problem behaviour (Hanley et al., 2003), this thesis aims to concentrate on two specific approaches that lend themselves to the assessment of insistence on sameness and resistance to change: the *Motivation Assessment Scale* (MAS, Durand & Crimmins, 1992) and the functional assessment with a multi-element format (Iwata et al., 1982/1994).

### **Classification of functional assessment procedures.**

Functional assessment procedures have been classified as indirect or direct. An indirect assessment is often referred to as an informant-based procedure, as it involves gathering information from parents, caregivers, teachers, and any other person directly involved with the individual (E. G. Carr, 2011). An indirect



assessment may take the form of a rating scale, structured interview, record review, as well as person-centred planning (E. G. Carr, 2011). The *MAS* (Durand & Crimmins, 1992), for example, is an indirect assessment in the form of a questionnaire that has broken down some of the causes of problem behaviour into four main categories. Questions on this scale surround functional situations in which specific problem behaviour may occur; access to attention, sensory feedback, a desire to escape a situation, and access to tangibles. For example, attention incorporates social positive attention (e.g. soothing words, comfort, and reassurance) and negative social attention (e.g. reprimands). Access to tangibles involves a desire for certain tangible items, and escape involves avoiding an unpleasant or difficult task or situation. Finally, the sensory feedback motivation includes automatic, self-reinforcing behaviour.

On the other hand, a direct functional assessment may be arranged systematically, and controls the introduction and removal of stimulus to observe behaviour (Iwata & Worsdell, 2005). The functional assessment with the multi-element format is a direct assessment (Iwata et al., 1982/1994; Sidman, 1960; Ulman & Sulzer-Azaroff, 1975), which is highly favoured due to its ability to combine several independent variables into one assessment (Hanley et al., 2003). The format of the multi-element approach is that it operates around the alternation of experimental conditions. The multi-element approach has mainly been used to assess self-injurious behaviours (Hanley et al., 2003), but has also more recently been employed to assess other problem behaviours (O'Reilly et al., 2010).

Indirect and direct approaches for assessing the function of behaviours have their own advantages and disadvantages. While the *MAS* (Durand & Crimmins,

1992) can be quick to administer (around 5 minutes to complete), thus requiring less effort than a direct approach, which requires several observations of behaviour over time (Iwata & Worsdell, 2005), it also does not require the provocation of behaviour (Durand & Crimmins, 1992; Iwata & Worsdell, 2005) as does the direct approach. From a practical standpoint, it would seem that an indirect approach is favourable to a direct approach in terms of administration time and provocation. However, the direct approach may provide more detailed information regarding the function of behaviour than the direct approach (Hanley et al., 2003). It has not yet been determined which approach may be better suited to the identification of the function of problem behaviour in children with ASD.

### ***Comparison of functional assessment approaches.***

A small number of researchers have made comparisons between indirect approaches, for example, the *Motivation Assessment Scale* (MAS, Durand & Crimmins, 1992), and direct approaches for functional assessment (Crawford, Brockel, & Schauss, 1992; Hall, 2005; Toogood & Timlin, 1996). Crawford et al. (1992), for example compared three functional assessment methods: the MAS (completed by both group home staff and vocational staff), an A-B-C observation method (direct observation in the person's natural setting), and a functional analysis using a multi-element design similar to the method described by Iwata et al. (1982/1994) to assess stereotypic behaviour (including neck twisting, body rocking, forehead thumping, repetitive vocalisations, and hair manipulation) in a classroom setting for four adults with severe to profound mental retardation. The results of the study indicated consistent ratings of a sensory function for the stereotyped behaviour for all participants on both the MAS and the A-B-C observations. However,

differential findings were evident for the multi-element functional analysis, with a different pattern of results for each participant. Differential findings were also evident in relation to other functions on the *MAS* and A-B-C observations. For example, the A-B-C observations did not demonstrate a tangible outcome, and rarely correlated with social interactions with staff for three out of the four participants. For one participant, the attention function was evident in 15% of intervals. In contrast, on the *MAS*, each of the other functions was highly rated, and also differences in ratings occurred between group home staff and vocational staff.

Mixed findings across methods have been found in other studies (Toogood & Timlin, 1996). For example, Toogood and Timlin (1996) examined the function of a range of challenging behaviours occurring in the residential setting for 20 individuals with severe learning disabilities including autism and Down syndrome, using five assessment methods. These were informant based approaches: an informant-based interview, the *MAS* (Durand & Crimmins, 1992), and an A-B-C chart (Meyer & Evans, 1989); descriptive analysis; and experimental analysis following the procedures used by Iwata et al. (1982/1994). It was found that agreement across methods was particularly low (e.g. the same function was identified for only 2.5% of the 121 behaviours assessed).

More recently Hall (2005) compared descriptive, experimental and informant based assessments for the assessment of problem behaviour (self-injury, aggression, disruption) in four individuals with severe/profound developmental disabilities. Comparison of results across the three methods showed that the informant and experimental procedures were concordant in 75% of cases, while descriptive and experimental methods were concordant in only 25% of cases. It was found that for

one participant, for example, an attention function was determined by both descriptive and experimental procedures, however, in the informant based assessment an escape function was identified. Hall indicated the importance of these findings in terms of the potential misidentification of functions of problem behaviour, and suggested that informant based assessments may operate better in conjunction with experimental assessments.

When placed together, these comparison studies suggest that it may be important to consider multiple assessment formats to increase the reliability (Hall, 2005) and validity (Toogood & Timlin, 1996) of functional assessment findings. It may also be important to consider diagnosis (Joosten & Bundy, 2008), differing topographies of behaviour (Duker & Sigafos, 1998), the context of the behaviour, for example with whom the behaviour is occurring (Crawford et al., 1992), as well as the natural environment in which the behaviour occurs (Toogood & Timlin, 1996).

*Differential outcomes according to perspective.*

A comprehensive review of studies using functional analysis has indicated that motivating factors tend to vary between individuals and contexts, but may also differ across topographies (Hanley et al., 2003). For example, examining the psychometric properties of the MAS (Durand & Crimmins, 1992), Duker and Sigafos (1998) found that the topography of behaviour may be differentially related to the function of the behaviour. For instance, self-injurious behaviour may be more commonly a function of socially mediated outcomes such as attention or access to tangibles, whereas stereotypy may more commonly represent a sensory function for the individual. That is, the dramatic nature of self-injury often requires attention in

the form of comfort, reprimands, or access to materials, for example bandages (Vollmer, Iwata, Zarcone, Smith, & Mazaleski, 1993), whereas stereotyped behaviour such as flapping hands may provide some sensory/perceptual reinforcement (Lovaas et al., 1987).

Using Rasch analysis to determine the construct validity of the *MAS* (Durand & Crimmins, 1992) with data from 67 children aged 5-18 years, Joosten and Bundy (2008) found evidence to suggest that diagnosis may explain differing motivations for engaging in stereotyped and repetitive behaviours. For example, Joosten & Bundy found differences in the hierarchy of motivating variables for children with autism and intellectual disability ( $n = 29$ ) as compared to those with intellectual disability alone ( $n = 38$ ). Joosten and Bundy also suggest that the function of behaviour may change over time. This was evidenced in their study by the existence of all motivators for the children with autism. It was argued that some children may learn about alternative benefits to replace or supplement original motivations for stereotyped behaviours over time.

As yet there appear to be no studies that have investigated the function of problem behaviour associated with insistence on sameness and resistance to change in children, and thus no comparisons between informant and experimental procedures for assessing behavioural flexibility in individuals. In light of the promising indications for the management of this behaviour discussed earlier in this thesis, it would seem to be important to investigate the motivations of behaviour as a basis for treatment.

### **Implications for treatment.**

An understanding of the variables that maintain problem behaviour has important implications for treatment. That is, strategies that are consistent with the observed function of the behaviour may be employed in treatment protocols (Sigafoos & Tucker, 2000). For example, an intervention taking account of an attention function may consist of noncontingent provision of attention. On the other hand, when the function of problem behaviour is escape from a difficult task, the child may be rewarded for their participation. Another strategy for decreasing problem behaviour is functional communication training (E. G. Carr & Durand, 1985).

Functional communication training has been used to replace attention, escape and tangible functions (Braithwaite & Richdale, 2000; Day, Horner, & O'Neill, 1994; Durand & Merges, 2001; Sigafoos & Tucker, 2000) either by providing the child with appropriate words/language, or by teaching the child to use manual signs. For example, an intervention taking into account an attention function may also benefit from strategies such as teaching the child to raise their hand (Sigafoos & Tucker, 2000). When problem behaviour is maintained by access to tangible items, the child may be taught to request preferred items. In terms of an escape function, children may be taught to request help with a difficult task, for example "I need help please" (Braithwaite & Richdale, 2000), or alternatively may be rewarded for participation (Sigafoos & Tucker, 2000).

Another strategy that might be utilised for the treatment of inflexible behaviour is to teach the child to problem-solve (Green, et al., 2008). This type of

strategy may involve teaching the child a set of verbal rules that can be used to prompt them to (a) decode (i.e. discriminate salient stimuli), (b) decide (i.e. identify an appropriate alternative), and (c) perform the appropriate behaviour (O'Reilly, Lancioni, Sigafoos, Green, et al., 2004). Teaching the child a functionally appropriate alternative to maladaptive behaviour should be seen as a major priority for children with ASD (Sigafoos, O'Reilly, Schlosser, & Lancioni, 2007).

Problem behaviours maintained by automatic reinforcement, that is behaviour maintained by its sensory consequences, or that directly terminates or decreases ongoing stimulation may be treated by providing the child with an alternative source of sensory stimulation (Sigafoos & Tucker, 2000). For example, a child may be provided with continuous access to stimuli that provide a similar sensory experience (Luiselli, 2008).

### **Functional assessment of problem behaviour in individuals with autism spectrum disorder.**

A number of researchers have demonstrated the purposeful nature of problem behaviours in individuals with developmental disabilities (E. G. Carr et al., 1994). For example, numerous studies have demonstrated functions of attention, escape, a desire to access tangible items and sensory seeking behaviours for the problem behaviours observed in these individuals (see Hanley et al., 2003 for a review). Love et al. (2009) suggested that problem behaviours in children with ASD may be conceptualised in a similar way to those with other developmental disabilities.

However, O'Reilly et al. (2010) demonstrated possible differences between children with autism and children with other developmental disabilities. Specifically,

O'Reilly et al. examined the percentage of intervals with challenging behaviour for 10 children with ASD over attention, demand, tangible, alone and play conditions in an extended multi-element functional assessment. O'Reilly et al. found that for eight out of 10 participants, problem behaviour appeared to be maintained by automatic reinforcement in the alone condition.

Similar findings have been observed using indirect functional assessment procedures. For example, Joosten and Bundy (2008), examined the four factor structure of the *Motivation Assessment Scale* (MAS, Durand & Crimmins, 1992) with 67 children with a dual diagnosis of autism and intellectual disability, and those with developmental disability only. Rasch Analysis was used to investigate the motivations of stereotyped repetitive behaviours. It was found that the motivations for stereotyped repetitive behaviours in children with autism were different to those with developmental disorder alone. For example, the children with autism demonstrated that their repetitive behaviours were more likely the result of sensory and escape functions. On the other hand, for the children with developmental disorders, repetitive behaviour stemmed mainly from a desire for attention and/or access to tangibles. In addition to these findings, Reese, Richman, Belmont and Morse (2005), carried out an indirect functional assessment to identify the function of problem behaviour for children with autism. It was demonstrated that problem behaviour was mainly motivated by access to tangible objects for sensory purposes, or to avoid unpleasant sensory stimuli.



## **Functional assessment of problem behaviour in typically developing individuals.**

Studies in typically developing populations have demonstrated that a variety of problem behaviours seem to serve the same purpose as the more severe problem behaviours observed in individuals with developmental disabilities (E. G. Carr et al., 1994). For example, infants have been observed to cry in order to escape from unpleasant situations, to gain attention, and to obtain tangible items. According to E. G. Carr et al., crying in these contexts may represent a form of communication.

The functional analysis of challenging behaviours in individuals without developmental disabilities is a relatively under-researched subject (Doggett, Edwards, Moore, Tingstrom, & Wilczynski, 2001; Dufrene et al., 2007; Hanley et al., 2003). Hanley et al. (2003) reviewed data from 277 direct functional analysis studies. Out of these, 25 had evaluated problem behaviours commonly observed in typically developing children. Despite this, there is some evidence to suggest that functional analysis procedures targeted at intervention for challenging behaviour in typically developing children may be useful. Functional analysis procedures have successfully identified the motivation of problem behaviours in regular classrooms (Broussard & Northup, 1995) and function-based interventions demonstrated decreases in problem behaviours in a number of typically developing children (Dufrene et al., 2007; T. J. Lewis & Sugai, 1996a, 2003).

Using a six-second, partial interval data collection system with four intervals (on-task, off-task with teacher, off-task with peers, off-task alone), to investigate high frequency/low intensity problem behaviours in three seven to nine year-old

typically developing children, Lewis and Sugai (1996b) identified social attention as the main function for off-task behaviour from teachers and especially peers. Based on previous literature, Broussard and Northup (1995) identified peer and teacher attention as well as escape from academic demands as the possible motivators of problem behaviour in the classroom setting. In order to examine this assumption, three children aged between six and nine years were selected to participate in their study based on a range of problem behaviours. While the target behaviour was different for each child, overall it included aggression, talking out, crying and non-compliance. Functional analysis was carried out using a single-case reversal as well as contingency reversals during which the consequence was presented contingently for an alternative (appropriate) behaviour and withheld following the target behaviour. It was found that the comparable topographies of problem behaviour for the children in this study were maintained by different maintaining variables (escape, peer attention, and teacher attention). Contingency reversals also showed the potential for successful treatment of the behaviours observed.

In typically developing populations, the targeted intervention strategy may be different to those commonly used in individuals with developmental disorders. For example, though functional communication training may be a suitable approach for individuals with ASD (E. G. Carr & Durand, 1985; Sigafos et al., 2007), many typically developing children may already have the appropriate communication strategy as part of their repertoire (T. J. Lewis & Sugai, 1996a). T.J. Lewis and Sugai (1996a) employed a novel approach to the treatment of a six-year-old typically developing child whose problem behaviours in the classroom were striking out at others, noisiness, and engaging other students in off task behaviours. Using an A-B-

C-D-C-D design for the treatment of social attention, T. J. Lewis and Sugai discovered that engaging a student peer in the classroom to provide prompts, instruction, and periodical praise (peer tutoring), was able to bring about decreases in problem behaviour.

In light of successful intervention strategies aimed at replacing maladaptive behaviours with pro-social behaviours in typically developing children, along with the evidence to suggest that a lack of behavioural flexibility may trigger problem behaviour in typically developing children as well as in children with ASD, it would seem important to gain an appreciation of the function of the associated problem behaviour in this group. To date there have been no studies examining the function of problem behaviour associated with insistence on sameness in typically developing children as well as in those with ASD.

### **Sameness Behaviour as an Operant Behaviour**

It remains uncertain if the tendency towards an insistence on sameness and resistance to change is in fact operant behaviour in the sense of being maintained by reinforcing consequences, and if so, what these maintaining consequences might be. The following paragraphs outline some possible motivations for the problem behaviour associated with insistence on sameness and resistance to change.

#### **Attention.**

It is possible that an insistence on sameness or resistance to change may be a socially reinforced behaviour (Durand & Crimmins, 1992). For instance, the comforting words that may perhaps follow reactions of frustration, for example when

a child makes a mistake, or when a planned event is cancelled, might reinforce the behaviour. As described above, social attention may also take the form of a reprimand (E. G. Carr & Durand, 1985). It is also possible then, that an individual who acts out in frustration from situations arising from an insistence on sameness and resistance to change is motivated by the attention that they will receive from reprimands.

### **Access to tangibles.**

A further possible motivating function of sameness behaviour might be to gain access to tangibles. Tangible items may include the child's personal possessions, toys, food or activities (Durand & Crimmins, 1992). Possible examples would be that when an activity is interrupted, the child wants to reinstate the activity, or when the child is required to try new foods or clothing they want to gain access to preferred food or clothing items.

### **Escape.**

Alternatively, the child may act out in frustration to avoid things that they find unpleasant or difficult (E. G. Carr & Durand, 1985; Durand & Crimmins, 1992). In this instance, problem behaviour occurs as an attempt to escape from a situation or activity. For example, when an unexpected interaction occurs, problem behaviour may be reinforced with the termination of any interaction. Or when a new activity is introduced into the child's routine, problem behaviour may result in the cessation of the activity.

### **Sensory/perceptual reinforcement.**

It is also possible that some sameness behaviours may be maintained by their direct sensory consequences. The child might insist, for example, that all the chairs are kept in a neat row because this provides some visually pleasing sensory/perceptual reinforcement. Lovaas, Newsom and Hickman (1987) argued that some self-stimulatory behaviours are perhaps maintained by perceptual, sensory consequences.

### ***Difficulties in testing for the maintenance of sensory reinforcement.***

According to Hanley et al. (Hanley et al., 2003), testing for the maintenance of sensory reinforcement is more easily achieved through an indirect assessment due to complexities in controlling or delivering sensory reinforcement. Common strategies in direct assessments include removing extraneous variables such as social reinforcement in 'alone' or 'ignore' conditions (Hanley, et al., 2003), however such strategies may not be the optimal basis for the observation of distinct behaviours such as an insistence on sameness and resistance to change. As such conditions may need to be adapted to suit the behaviour. It also remains unclear, as to whether direct and indirect assessments would be consistent in measuring the function of sameness behaviour. In this thesis a direct play-based functional assessment to observe the function of problem behaviour associated with an insistence on sameness and resistance to change will be examined.

## **The Potential for a Play-based Functional Assessment**

Green et al. (2007) suggested that a possible reason for problem behaviours associated with a lack of behavioural flexibility to persist is that the child may lack the alternative skills (e.g. play skills) that would enable them to obtain pleasant sensory stimulation by alternative means, or the communication skills, for example, to request an alternative when faced with change. With a focus towards treatment to teach problem solving and tolerance for change, Green et al. (2008) demonstrated that a play-based assessment was helpful in providing a means for assessing tolerance and problem solving for the frustration involved with an insistence on sameness and resistance to change. As children have the potential to learn to socialise, and develop the social skills to help them to problem solve through play (Stagnitti, 2003), it would seem that a play-based functional treatment procedure would be an appropriate means for teaching these skills to children.

Considering that functional treatment strategies may hold promise in the management of problem behaviour associated with insistence on sameness and resistance to change (Green, et al., 2008), a functional assessment of the behaviour appeared to be the logical next step. It also seemed appropriate to incorporate Green et al.'s (2008) play-based procedure into the functional assessment paradigm, as it has the potential to link particular situations where children insist on sameness and resist change to particular functions. Moreover, the same play-based scenarios may be utilised in the function based treatment that may follow. According to Stagnitti (2004a, 2004b), this may be a model approach to such function based treatment.

### **Ecological validity of the play-based functional assessment.**

Usually, a direct functional assessment procedure is carried out under conditions that are equivalent to the individual's natural setting, so as to allow the experimenter to manipulate potential antecedents and consequences in a systematic manner (Hall, 2005; Iwata, Vollmer, & Zarcone, 1990). However, when developing new behavioural assessment approaches, it is particularly important to take into account the natural setting that a particular behaviour may occur in (Singer, 2000). Previous research suggests that this so called "ecological validity" may be produced by employing natural, child directed play (Hanley, Iwata, & McCord, 2003; Neisworth & Bagnato, 2004). This may be achieved by using toys from the child's environment or by engaging in spontaneous play. This contextual aspect of ecological validity, which may provide a more authentic frustration to the child (Green et al., 2008) is yet to be explored in this type of assessment. Moreover, it remains unknown whether Green et al.'s (2008) play-based paradigm provides an ecologically valid fit for the functional assessment of inflexible behaviour.

### **Significance of the play-based functional assessment.**

Play is a valuable resource in terms of treatment and assessment, as play is one of the most natural activities of childhood (Lifter, 2008). Generally, interventions that use play are those that aim to teach play (Lifter, 2008), for example, the *Denver Program* (Rogers, 2005), and the *Learn to Play* program (Stagnitti, O'Connor, & Sheppard, 2012). These intervention procedures will often use preferred toys, or preferred play areas as opportunities to teach play. On the other hand, Stagnitti (2004a) highlights the 'functionalist' view of play, which suggests

that play may also be used as a means to develop other skills, such as cognitive flexibility, adaptability, problem-solving, as well as social, emotional, and physical skills. Indeed, using a play intervention based on the *Learn to Play* program, O'Connor and Stagnitti (2011) demonstrated less socially disruptive behaviour and increases in language skills for 19 children with autism and other developmental disorders compared to a comparison group of children participating in traditional classroom activities who were more socially disruptive and disconnected.

Correspondingly, play-based assessments have been used to evaluate social engagement (Wimpory, Hobson, & Nash, 2007), social emotional behaviour, and to assess areas of functioning in childhood including intelligence, motor skills, language (Dykeman, 2006), and neuropsychological evaluation (Dykeman, 2008). Assessments involving play allow the child to express themselves in a natural and flexible environment, and are less stressful, more engaging, as well as more reflective of the child's typical behaviours than other standardised procedures (Dykeman, 2008; Farmer-Dougan & Kaszuba, 1999; Linder, 1993; Sturges, 2009). As such they provide an ecologically valid basis for the assessment of the idiosyncratic functional characteristics of sameness behaviour in children that can be used to inform treatment aimed at improving behavioural flexibility.

## **Chapter Summary**

This chapter provided an outline of an insistence on sameness and resistance to change in children with ASD, describing its context within diagnosis and assessment. Studies showing a potential heritable component to the behaviour emphasised the importance of understanding behavioural flexibility within the



framework of assessment and diagnosis. This may be extended to recent consideration of the categorisation of ASD subtypes. For example, the chapter outlined details in relation to the possibility that there may be differences in the manifestation of the behaviour according to autistic severity and age. It also included a summary of current notions surrounding the origin of an insistence on sameness and resistance to change. This was followed by a description of the problem behaviour often associated with an insistence on sameness and resistance to change. Current intervention strategies were described, along with the available assessments for informing such intervention, including functional assessment procedures. It is integral that assessments that are used to inform intervention are evidence based. That is, they are empirically proven and supported by data (Ozonoff, Goodlin-Jones, et al., 2005). A play-based functional assessment was proposed as a practical method of measuring the functional properties of an insistence on sameness and resistance to change.

A chief aim of this thesis was not only to implement the play-based assessment, but to examine it alongside an indirect assessment of the behaviour using the Motivation Assessment Scale (Durand & Crimmins, 1992). However, prior to carrying out the play-based assessment it first seemed important to determine some of the characteristic features of an insistence on sameness and resistance to change in ASD with the purpose of verification of the tools used in its implementation. The following chapter outlines the principle methodology involved in investigating the aims of the thesis across the three studies.

## Chapter 3

### General Methodology

#### Overview

A key aim of the thesis was to determine the functional properties, if any, of an insistence on sameness and resistance to change in children with ASD. To this end, Green et al.'s (2008) play-based assessment procedure, which used the *Behavioural Flexibility Rating Scale-Revised* (BFRS-R, Green, et al., 2007) to shape scenarios for the observation of inflexible behaviour was adapted to operate around a multi-element functional assessment paradigm (Iwata et al., 1982/1994). Three studies were designed to validate the play-based functional assessment procedure.

The three studies were incorporated within a mixed-method design. The design combined quantitative data collection in the form of a survey (*Study 1*), and observation using functional assessment procedures, both direct (*Studies 2 and 3*), and indirect (*Study 3*). The first study permitted an in-depth exploration of sameness behaviour in children with ASD (high and low functioning) compared to typically developing children. The second study investigated a play-based functional assessment procedure for identifying the motivation of insistence on sameness and resistance to change in children with ASD. The third and final study explored direct and indirect observational methods to confirm the practicability of the play-based functional assessment procedure.

The first, a survey study was designed with the key aim of confirming the validity of the *BFRS-R* (Green, et al., 2007) in order to enhance validity of the play-

based assessment findings. This study aimed to contribute to a deeper understanding of the form and function of insistence on sameness and resistance to change in children with ASD as compared to typically developing children. Nine questionnaires were distributed to the parents of children with and without ASD to determine relations, if any, among assessment scores, and group differences between HFA, LFA and typical development.

The second and third studies in this thesis were case studies that employed the play-based functional assessment procedure. The first case study investigated the motivation for insistence on sameness and resistance to change in an 11-year old boy with Asperger syndrome. A further two case studies were carried out in the third study to confirm the significance of the play-based assessment procedure. This study compared the results of the play-based functional assessments for two boys aged four and six to an indirect assessment, the *Motivation Assessment Scale* (MAS, Durand & Crimmins, 1992). This chapter provides brief outline of, and justification for the methodology used across the three studies.

## **Participants**

Forty-three parents of children aged between two and 13 years of age (mean age = 6.7 years) were recruited for the survey study. Children were recruited according to either no previous diagnosis (NPD) or a previous diagnosis of ASD (including autism, HFA, Asperger syndrome, or PDD-NOS) with diagnosis carried out by a paediatrician or an assessment team (as recorded on the General Information Questionnaire, Appendix A). Those with no previous diagnosis were defined as typically developing. Confirmation of diagnosis was carried out in *Study 1* using the

*Childhood Autism Rating Scale* (CARS, Schopler, et al., 1988) and the *Gilliam Autism Rating Scale-2<sup>nd</sup> Edition* (GARS-2, Gilliam, 2006). Table 3.1 shows demographic information for the 43 participants.

Table 3.1  
*Frequency and Percentages of Gender and Diagnostic Category for the 43 Participating Children*

Participants		Frequency	%
Gender	Male	36	83.7
	female	7	16.3
Primary Diagnosis	Autism	10	23.3
	HFA	4	9.3
	ASD	7	16.3
	Asperger syndrome	5	11.6
	PDD-NOS	2	4.7
	Typical Development	15	34.9

The studies focussed on children aged between two and thirteen years of age for a number of reasons. Firstly, this period during a child's development has been indicated as notable for the occurrence of insistence on sameness and resistance to change (Evans et al., 1997; Glenn et al., 2012; Richler et al., 2010). Secondly, this age group provided a good fit with the assessment tools used in the study. And thirdly, it is during these early education years where intervention has been shown to have the most positive outcomes (Roberts & Prior, 2006).

## **Recruitment.**

The current research was carried out in an area with a small population base and thus with limited potential for the recruitment of participants with a diagnosis of ASD. For this reason, the survey procedure was adopted in *Study 1* to allow for a wider recruitment base, thus increasing the power of results. Recruitment of participants was carried out following approval from the Human Research Ethics Committee (Tasmania, See Appendix B).

Email requests for participation in the survey study were sent out to autism groups in Tasmania and Victoria. This included 132 parents of children with ASD listed on the Autism Victoria ‘Get Involved’ database and an unknown number from the Autism Tasmania Support Group Network. This latter group was contacted by the Support Group Coordinator to ensure anonymity. There were 33 positive responses from Autism Victoria, and 24 from Autism Tasmania. Recruitment was also carried out through two child care centres and one school in southern Tasmania via the distribution of information sheets and letters (see Appendix C).

Overall, 79 parents were sent packages following a positive response to recruitment efforts. Thirteen forms were returned from the Autism Victoria group (39.4 %) and 14 from Autism Tasmania (58.5 %). Out of the child care centres and schools, 16 packages (72.7 %) were completed and returned. Table 3.2 shows recruitment data and response rates.

Table 3.2

*Response Rate Data from Autism Databases, Schools and Child Care Centres*

Contacts	Number of Positive Responses	Number Returned Complete	%
Autism Victoria	33	13	39.4%
Autism Tasmania	24	14	58.5%
Child Care Centres & Schools	22	16	72.7%
Total	79	43	54.4%

Survey information was also utilised to determine potential participants for the play-based functional assessment procedures described in *Studies 2* and *3*.

Parents of children reported to have moderate to severe problems on at least three items on the *Behavioural Flexibility Rating Scale-Revised* (BFRS-R, Green, et al., 2007), and who resided in the same city as the researcher (so as to enable play sessions to be carried out) were contacted for possible recruitment into the second and third studies.

## **Materials**

The survey instruments used across the three studies were chosen according to a number of criteria. Firstly, the instruments selected were each able to be completed in a short period of time, so as to minimise the burden on participants. Also, tools corresponding to the age range of participants selected for the study were chosen. Tools also corresponded to those used in autism research, and include the

complete range of behaviours that are seen in autism. This is an important aspect for consideration when examining the characteristics of autism in typically developing children (Leekam et al., 2007).

Nine assessments, questionnaires and rating scales were included across the three studies, each with a specific purpose. The *Behavioural Flexibility Rating Scale-Revised* (BFRS-R, Green, et al., 2007) was used to determine particular situations where children insist on sameness and resist change (see Appendix D). In *Study 1* this information was used to determine group differences in the expression of the behaviour. In *Studies 2* and *3*, distinct scenarios were constructed around problem situations identified on the *BFRS-R* for the purpose of identifying the function of the problem behaviour associated with those situations. The *Sameness Questionnaire* (Prior & MacMillan, 1973, Appendix E) was included in *Study 1* as a means to test the construct validity of the *BFRS-R*. The *Motivation Assessment Scale* (Durand & Crimmins, 1992) was used to identify the possible motivational variables maintaining problem behaviours associated with a lack of behavioural flexibility. In *Study 1*, group differences on the *MAS* were examined. In *Study 3*, *MAS* results were compared to the results of the play-based assessment.

Three assessments were included for the purpose of identifying possible mediating relationships to the problem behaviour associated with insistence on sameness and resistance to change. The *Aberrant Behavior Checklist* (ABC, Aman & Singh, 1994) was used as a measure of the extent of problem behaviours commonly occurring for the children in the study. The *Vineland Adaptive Behavior Scales-2<sup>nd</sup> Edition* (Vineland-II, Sparrow et al., 2005) was used to assess adaptive

behaviour functioning, and the *Short Sensory Profile* (SSP, McIntosh, Miller, Shyu, & Dunn, 1999) assessed sensory sensitivity in the children.

A General Information questionnaire (see Appendix A), was used to obtain children's diagnostic status and supplementary information. In order to increase the reliability of diagnostic status, two assessments were selected to confirm children's diagnosis. The *Childhood Autism Rating Scale* (CARS, Schopler et al., 1988) was chosen to verify children's diagnostic status (i.e. ASD/no ASD) as well as to determine severity of ASD. The *Gilliam Autism Rating Scale-2<sup>nd</sup> Edition* (GARS-2, Gilliam, 2006) was used to confirm children's diagnosis. The following sections will describe each assessment.

### **The Childhood Autism Rating Scale (CARS).**

The *Childhood Autism Rating Scale* (CARS, Schopler et al., 1988) is a widely used autism behavioural diagnostic scale. The 15 items incorporate the five major diagnostic systems for autism: (a) Kanner (1943), (b) Creak (1961), (c) Rutter, (1978) (d) the National Society for Autistic Children (1978), and (e) the DSM-IV (American Psychiatric Association, 1994), and as such reflect the primary characteristics of autism. Items are given a rating from 1- 4 based on the distinctiveness and extent of the behaviour in relation to what would be observed in a child of the same age. For example, a rating of (a) 1= within normal limits for that age, (b) 2.5= mildly to moderately abnormal for that age, and (c) 4= severely abnormal for that age. The scale can be used as an observation schedule as well as a tool for parent report, and takes approximately 10-15 minutes to complete. Example items include: *Adaptation to change; Listening response; Verbal communication.*



The *CARS* was standardised primarily on children with autism, and is able to discriminate between individuals with and without autism, as well as to distinguish severity (Schopler et al., 1988). The *CARS* has proven to be a valid and reliable instrument for the identification of autism (Ozonoff et al., 2005), especially for children with LFA (Dickerson Mayes et al., 2009).

### **The Gilliam Autism Rating Scale-2<sup>nd</sup> Edition (GARS-2).**

The *Gilliam Autism Rating Scale-2<sup>nd</sup> Edition* (GARS-2, Gilliam, 2006) is a norm-referenced assessment reflecting recognised definitions and criteria for autism provided by the Autism Society of America (2003) and the American Psychiatric Association (2000). The *GARS-2* follows the *Gilliam Autism Rating Scale* (GARS, Gilliam, 1995) as an autism screening tool developed to discriminate between children with autism and other behavioural problems. The 42 item screening assessment has been normed for individuals aged between 3 and 22. The assessment is divided into 3 subscales: (a) Stereotyped Behaviours, (b) Communication, and (c) Social Interaction. Items are rated by the parent/caregiver on a Likert-type scale according to the frequency to which behaviour is observed: (0) never, (1) seldom (1-2 times per 6 hour period), (2) sometimes (3-4 times per 6 hour period), and (3) frequently (5-6 times per 6 hour period). The *GARS-2* takes approximately 5-10 minutes to complete. Example items include: *Whirls, turns in circles; Repeats (echoes) words verbally or with signs; withdraws, remains aloof, or acts standoffish in group situations*. The *GARS-2* has been proven to be a valid and reliable instrument for providing information related to the diagnosis of autism (Gilliam, 2006; Pandolfi, Magyar, & Dill, 2010).

### **The Motivation Assessment Scale (MAS).**

Durand and Crimmins (1992) developed the *Motivation Assessment Scale* (MAS) to assess the motivating properties of problem behaviour. A specific behaviour is identified (e.g. a tantrum or self-injury) and responses are given to a series of 16 questions which are then used to establish whether the behaviour is motivated by (a) the desire to escape the situation, (b) to gain attention, (c) to maintain sensory stimulation, or (d) to gain access to tangible items. The scale is completed by the parent, teacher or caregiver and takes approximately 5-10 minutes to complete. Example questions are: *Does your child seem to do this behaviour to get you to spend time with him or her?; Does this behaviour occur when you take away a favourite object, activity or food?; Does this behaviour occur when any request is made of your child?* The MAS has been used across a wide sample of participants of varying age and disability (Durand & Crimmins, 1992). The scale has been shown to be reliable and valid for the assessment of the functional properties of self-injurious behaviour (Durand & Crimmins, 1992), although it has lower reliability for other forms of problem behaviours such as aggression (Duker & Sigafos, 1998).

### **The Behavioural Flexibility Rating Scale-Revised (BFRS-R).**

The *Behavioural Flexibility Rating Scale-Revised* (BFRS-R, Green, et al., 2007) outlines specific situations that have been shown to evoke problem behaviour in relation to an insistence on sameness and resistance to change for individuals with ASD (see Appendix D). The 16 item questionnaire is scored according to a 4-point Likert scale. The scale corresponds to the severity to which the situation is a problem

for the individual, and ranges from (0) not a problem; he or she may cope with the situation (1) the situation causes minor problems; short-lived (less than one minute) fussing, complaining – eventually accepting the change (2) the situation causes moderate problems; agitation, mild tantrums, stomping feet, crying (for 1-2 mins), eventually accepting the situation change, to (3) the situation causes severe problems; a major tantrum including aggression, screaming, and/or self-injury. The scale is completed by someone who has known the person for at least 6 months. This may be a parent, caregiver, teacher or other professional. The *BFRS-R* takes around 5-10 minutes to complete. Example items are: *An object or some materials that the person was using breaks or malfunctions; Materials run out, causing a premature end to an activity; The person is required to try something new, for example new foods or change of clothing.*

Whilst there has only been a small amount of research that has utilised this newly developed instrument (Didden et al., 2008; Green et al., 2008) , and its earlier version, the *Behaviour Flexibility Rating Scale* (BFRS, Green, et al., 2006) from which 11 items remain in the *BFRS-R* (Green, et al., 2007), the preliminary results of the existing research suggests the *BFRS-R* is reliable and valid for identifying situations that evoke problem behaviours associated with insistence on sameness or resistance to change.

### **The Sameness Questionnaire.**

The *Sameness Questionnaire* was developed by Prior and MacMillan (1973) to assess sameness behaviour (see Appendix E). It was intended to be completed by those who have known or cared for the individual in the six months prior to

assessment. The *Sameness Questionnaire* takes approximately 5-10 minutes to complete. Examples of items include: *Does your child become very upset if interrupted in what he/she is doing?*; *Does your child insist on wearing the same clothes?*; *Does your child line things up in rows and refuse to have them disturbed?* The respondent is asked to rate the extent to which behaviours corresponding to each of 28 items are evident for the individual on a 3-point Likert scale ranging from (0) not present; the child shows no particular desire for sameness relevant to the question, (1) present to some degree; the behaviour may be present but not strongly marked, to (2) present to a considerable degree; severe, marked, or frequent behaviour in relation to the question. There are a limited number of studies that have utilised this scale, and as such information regarding its psychometric properties is scarce. Green et al. (2008) used the *Sameness Questionnaire* to provide supplementary information to support their own findings using the *BFRS-R*. The results across the two scales were consistent supporting their construct validity.

### **The Vineland Adaptive Behavior Scales-2<sup>nd</sup> Edition (Vineland-II).**

*The Vineland Adaptive Behavior Scales-Second Edition* (Vineland-II, Sparrow et al., 2005) measures adaptive behaviour in individuals aged from birth through until 90 years of age. The Parent/Caregiver Rating Form assesses adaptive behaviour within the domains of (a) communication, (b) socialisation, (c) daily living and (d) motor skills. Standard scores are produced for the four domains as well as age equivalent scores for domain raw scores, and an overall adaptive behaviour composite score. The composite score of the four domains enables the adaptive behaviour composite score to be calculated for children aged from birth through to six years. From ages seven through to 90, the composite score of the

communication, socialisation, and daily living skills domains determines the adaptive behaviour composite. The interviewer provides a score of (0) if the individual never performs the behaviour, (1) if the behaviour is sometimes performed without help or reminders, and (2) if the individual usually performs the behaviour without help or reminders. The Parent/Caregiver Rating Form takes approximately one half hour to complete. Example items include: *Listens to a story for at least 15 minutes; asks to use toilet; chooses not to say embarrassing or mean things or ask rude questions in public.* Norms for this scale were based on a sample of over 3,000 individuals. The *Vineland-II* has been shown to have good internal consistency, external validity and validity of the rating process (Sparrow et al., 2005).

### **The Aberrant Behaviour Checklist (ABC).**

The *Aberrant Behavior Checklist-Community* (ABC-C; Aman & Singh, 1994) is a 58-item rating scale that assesses problem behaviour areas for individuals in the home, school, work (community) across all ages. The scale incorporates five areas: (a) irritability (15 items), (b) lethargy (16 items), (c) stereotypy (7 items), (d) hyperactivity (16 items), and (e) inappropriate speech (4 items). The respondent rates the person's behaviour over the last four weeks according to whether the behaviour is (0) no problem, (1) a slight problem, (2) a moderately serious problem, and (3) a severe problem. The respondent, usually a parent or caregiver is required to take into account the relative frequency of the behaviour, whether it interferes with the person's development, functioning, or relationships, and whether the behaviour may be observed by others, but not with the person completing the form. The *ABC-Community* takes approximately 10 minutes to complete. Example items include:

*Impulsive (acts without thinking); cries and screams inappropriately; mood changes quickly.* The *ABC–Community* provides norms for individuals in special education placements and group homes (Aman & Singh, 1994). It has been demonstrated to be valid for parent report (Brown, Aman, & Haverkamp, 2002) and for use in young children, including those with ASD (Brinkley et al., 2007; Karabekiroglu & Aman, 2009).

### **The Short Sensory Profile (SSP).**

The *Short Sensory Profile* (SSP, McIntosh et al., 1999) was developed to assist service providers with intervention planning and to provide researchers with a measure of sensory processing that could be easily incorporated into research designs. It is based on the *Sensory Profile* (Dunn, 1999) which provides information about children's responses to sensory stimuli, as well as the systems that may affect functional performance (Smith-Myles et al., 2004). The 38 item short form measures sensory modulation during daily life. Sections in the *SSP* include measures of a child's response to: (a) touch experiences (Tactile Sensitivity), (b) taste and smell experiences (Taste/Smell Sensitivity), (c) movement experiences (Movement Sensitivity) as well as the child's level of (d) perceiving sensory events (Underresponsive/Seeks Sensation). It also includes measures of the child's ability to: (e) use and screen out sounds (Auditory filtering), (f) use muscles and move (Low Energy/Weak), as well as the child's response to (g) sights and sounds (Visual/Auditory sensitivity). Items are scored according to the frequency to which behaviour is observed when presented with the opportunity: (1) always, (2) frequently, (3) occasionally, (4) seldom, and (5) never, with lower scores reflecting poorer performance, or a higher rate of the behaviour. The short form takes about 10

minutes to complete. Example items include: *Avoids certain tastes or food smells that are typically part of children's diets; Withdraws from splashing water; has trouble completing tasks when the radio is on.* The SSP has good internal and construct validity, discriminating for children with and without disabilities (McIntosh, Miller, Shyu, & Dunn, 1999).

### **General Information questionnaire.**

A form for basic descriptive information (*General Information* questionnaire, Appendix A) was constructed for the purpose of acquiring supplementary information pertaining to diagnosis, language proficiency, family, and medical history in the event that further information was needed. The *General Information* questionnaire takes approximately 5 minutes to complete.

### **Procedures**

Forms, with the exception of the *Vineland II* (Sparrow et al., 2005), were sent out to participating parents in packages. Packages contained two reply paid envelopes containing eight assessments (4 in each). Given the number of questionnaires/rating scales for completion, it was determined that allowing parents to fill out forms in batches, and in their own time would minimise both participant fatigue and inaccurate reporting. Twenty-three parents (53.5 % of total) completed the *Vineland Adaptive Behaviour Scales-2<sup>nd</sup> Edition* (Vineland-II, Sparrow et al., 2005) via telephone or face-to-face interview with the researcher.

Individual information from the *BFRS-R* (Green, et al., 2007), *Motivation Assessment Scale* (MAS, Durand & Crimmins, 1992), *Aberrant Behavior Checklist*

(ABC, Aman & Singh, 1994), and *Vineland Adaptive Behaviour Scales-2<sup>nd</sup> Edition* (Vineland-II, Sparrow et al., 2005) was also utilised to inform the play-based functional assessment *Studies 2* and *3*. The novel functional assessment procedure utilised in the current thesis followed a direct multi-element approach (Iwata et al., 1982/1994) and used Green et al.'s (2008) play-based assessment procedure as a framework.

Taking into consideration the promise for functional treatment strategies in the management of problem behaviour associated with insistence on sameness and resistance to change (Green, et al., 2008), a functional assessment of the behaviour appeared to be warranted. There also appeared to be merit in incorporating Green et al.'s (2008) play-based procedure into the functional assessment paradigm, as it has demonstrated the potential to link specific scenarios where children insist on sameness and resist change to particular functions. These play-based scenarios may then be utilised in the function based treatment that follows. Stagnitti (2004a, 2004b), suggests that this may be a model approach to such function based treatment.

Within the applied behaviour analysis theoretical framework, problem behaviours are conceptualised as operant responses that may be shaped and maintained by contingencies of reinforcement. As described earlier in this thesis (see *Chapter 2* for further details), the multi-element approach involves recording behaviour under different experimental conditions (Iwata et al., 1982/1994). This type of direct assessment is highly favoured due to its ability to combine a number of independent variables into the one assessment (Hanley, et al., 2003). The procedures employed in the current thesis recorded the severity of problem behaviour under: (a)



attention, (b), escape, (c) tangible, and (d) restore conditions (see Appendix F for operational guidelines and Appendix G, record sheet). Functional analysis procedures were conducted over ten sessions that lasted 30 minutes each. Prior to this, parents were provided with a reinforcer checklist (Appendix H) to determine items for a preference assessment. The preference assessment was carried out over two sessions, to establish preferred items for the tangible condition. Following a baseline of four sessions where no manipulation was carried out, each session, contained two manipulated scenarios. A second assessor was present for 25% of scenarios. In *Chapter 6*, this direct approach was compared to the *Motivation Assessment Scale* (Durand & Crimmins, 1992), an indirect assessment in order to increase the reliability (Hall, 2005) and validity (Toogood, & Timlin, 1996) of the play-based assessment findings. Further details of the functional analysis procedures specific to each of the studies are presented in *Chapters 5 and 6*.

The following chapter outlines the survey study with the key aim of determining the characteristics of insistence on sameness and resistance to change. Specific methodology and data emerging from the nine assessments and questionnaires for 42 participants is presented.

## **Chapter 4**

### **Study 1. Characteristic Differences in Flexible Behaviour: Validating the BFRS-R**

#### **Overview**

There appear to have been only a few studies to date that have examined insistence on sameness and resistance to change in individuals with ASD and other developmental disabilities. Moreover, despite evidence to suggest differences in the behaviour between ASD subtypes, and also observations of the behaviour in typically developing children, there appear to have been no studies to date that have investigated the differences of the behaviour between these various groups using detailed measures of insistence on sameness.

This chapter described a study that aimed to investigate differences between three groups regarding form and function of the behaviour. Two of these groups represented high and low levels of functioning in ASD: high functioning autism (HFA), low functioning autism (LFA). The third group was made up of typically developing children (TD). The study employed a survey methodology incorporating tools that are equivalent to those used in autism research. This is an important feature when examining the characteristics of autism in typically developing children (Leekam et al., 2007). The study also provides a framework in which to account for further validation of the *Behavioural Flexibility Rating Scale-Revised* (BFRS-R, Green et al., 2007).

## **Validating the Behavioural Flexibility Rating Scale-Revised**

As outlined in *Chapter 1*, there are limited instruments available for measuring instances of insistence on sameness and resistance to change. Out of the few existing tools, Green et al.'s (2007) *Behavioural Flexibility Rating Scale-Revised (BFRS-R)* shows promise as a means for identifying problem situations in terms of insisting on sameness and resisting change. To date, it appears to be the most well-researched assessment tool for measuring instances of insistence on sameness and resistance to change. Green et al. (2008), for example, used the *BFRS-R* (an indirect assessment) to identify situations where children lack tolerance for change and/or lacked the problem solving skills to enable them to cope with change, and validated the results against a play-based (and direct assessment) protocol. In the current thesis, I have adapted this play-based assessment protocol to determine its utility for identifying the possible motivational aspects of problem behaviours associated with insistence on sameness and resistance to change.

The *BFRS-R* (Green et al., 2007), was developed to provide a means for identifying problem situations that may be related to a lack of behavioural flexibility as distinct from other ASD traits. The *BFRS-R* follows an earlier version, the *Behavior Flexibility Rating Scale* (BFRS, Green, et al., 2006). The *BFRS* was created following a systematic review of the literature to identify descriptions of sameness behaviour. In doing this, the authors set out to cover five major problem situation areas predicted to discriminate between individuals with and without ASD. The five areas are as follows: (a) a preferred item is missing, broken or unavailable; (b) an event is cancelled, delayed or interrupted; (c) the individual is subjected to unexpected sensory stimulation; (d) the individual fails a task; and (e) a task is left

uncompleted. While previous studies utilising the *BFRS* and *BFRS-R* have shown differences between children with Down syndrome (Didden et al., 2008; Green, et al., 2006) and Angelman syndrome (Didden et al., 2008) and ASD, the *BFRS-R* has not yet been assessed with typically developing children.

### **Inflexibility as a Function of ASD Severity**

Previous research points towards level of cognitive/adaptive behavioural functioning (Turner, 1999) as an important variable for investigation. As described in the previous chapter, within the limited amount of research focussing on insistence on sameness in ASD, it has been demonstrated that inflexible behaviour may be more common in higher functioning individuals (Cuccaro et al., 2003; Green, et al., 2006; Prior & MacMillan, 1973; Szatmari et al., 2006; Turner, 1999). However, additional research is needed to substantiate this hypothesis, hence the purpose of the present study.

According to Didden et al. (2008), it would also be important to identify some of the constitutional variables and motivational “drives” that might influence the apparent need for an insistence on sameness or resistance to change. Considering the focus on behavioural deficits that may benefit from specific types of intervention in this thesis, the current study explores the functions of escape, tangible, attention and sensory behaviours for insistence on sameness and resistance to change, as well as adaptive functioning, sensory, and affective responses using established instruments intended for these purposes.

In terms of adaptive behaviour, it has been suggested that relative social immaturity as well as emotion regulation (Green et al., 2008) may play integral roles.

For example, it is possible that children with high functioning autism or Asperger syndrome lack the social maturity to hold back their emotions when faced with the frustrations of change (Attwood, 2006b). This might in turn interfere with opportunities to apply problem solving skills. Affective responses may also play an important part. For example, anxiety has been suggested to influence rituals and compulsions (Evans & Gray, 2000; Matson & Dempsey, 2009) and hyperactivity and aggression have been suggested to play a role in stereotypic behaviours (Sukhodolsky et al., 2008).

Considering previous research investigating possible associations between repetitive behaviours and sensory abnormalities in ASD (Boyd et al., 2010; Boyd et al., 2009; Gabriels et al., 2008), it is also possible that atypical sensory responses may play a part in inflexible behaviour. Indeed, food selectivity and ‘just right’ behaviours (Cermak et al., 2010; Evans & Gray, 2000) reflect this notion, as does the idea of a preferred sensory perceptual experience (Evans & Gray, 2000; Lovaas et al., 1987; Smith-Myles et al., 2004), for example the feeling of particular fabrics against the skin. Alternatively, the experience of an environment which is constant may provide some reassurance to the child who is unable to construct new internal schema to enable them to familiarise themselves to a new situation (Kootz et al., 1982).

## Method

### Overview

A survey method was employed to determine relations, if any, among the children's assessment scores and mean differences between groups.

### Participants

Overall 43 parents of children aged between 2 and 13 years of age (mean age = 6.7 years) participated in this study. Out of these, 28 children had been diagnosed with an ASD, and 15 were typically developing children.

Children diagnosed with ASD were divided into groups according to parent reported Intelligent Quotient (IQ) scores. Respondents were asked to indicate the child's diagnosis on the *General Information* questionnaire (see Appendix A). Children with an IQ of 85 and above were allocated to the 'high functioning autism' (HFA) group ( $n = 17$ ), and children with reported IQ's of 84 and below were assigned to the 'low functioning autism' (LFA) group ( $n = 8$ ). IQ's were not reported for three of the children with a reported ASD. For these three children, the *Childhood Autism Rating Scale* (CARS, Schopler et al., 1988) was used to inform group allocation based on severity of symptoms. Cronbach's alpha (Cronbach, 1951) was used to confirm the reliability of this approach. A Cronbach's alpha value of .946 across the 15 items of the *CARS* was consistent with the items forming a reliable, uni-dimensional scale.

Based on these results, the three children were allocated to the HFA group, making the total for this group  $n = 20$ . Children in the typically developing (TD)

group were those who were reported to have no previous diagnosis (NPD), and who showed no evidence of major birth difficulties according to parent report. One child was omitted from the latter group because of suspected ASD. All children in the typically developing group were reported by parents to have IQ's greater than 85 ( $n=14$ ). Table 4.1 shows the diagnostic and functional characteristics of the three groups.

Table 4.1

*Number, Percentage, and Functional and Diagnostic Characteristics of the Three Groups: High Functioning Autism (HFA), Low Functioning Autism (LFA) and Typically Developing (TD)*

Group	<i>n</i>	%	IQ Range	Primary Diagnosis (n)
HFA	20	48%	Average (85-115) - Superior (IQ>115)	Autism (5), ASD (6), HFA (4) PDD-NOS (1), AS (4)
LFA	8	19%	Moderate (35-74) - Below average (75-84)	Autism (5), ASD (1), PDD-NOS (1), AS (1)
TD	14	33%	Average (85-115)	No previous diagnosis

\*ASD = autism spectrum disorder

HFA = high functioning autism

PDD-NOS = pervasive developmental disorder not otherwise specified

AS = Asperger syndrome

TD = typical development



*Childhood Autism Rating Scale* (CARS, Schopler et al., 1988) and *Gilliam Autism Rating Scale-2nd Edition* (GARS-2, Gilliam, 2006) scores were used to verify the diagnostic status of children for group comparison. These scales were described in *Chapter 3*. Mean CARS and GARS-2 scores for the three groups reflected children's previous diagnostic status (i.e. ASD, no previous diagnosis). There were significant differences between typically developing children ( $M = 13.57$ ,  $SD = 12.617$ ) and both the HFA ( $M = 42.25$ ,  $SD = 21.371$ ) and LFA ( $M = 54.88$ ,  $SD = 18.473$ ) groups on the GARS-2,  $F(2, 39) = 15.794$ ,  $p = 0.000$ , and between LFA children ( $M = 36.938$ ,  $SE = 1.955$ ) and typically developing children ( $M = 17.750$ ,  $SE = 1.478$ ) on the CARS,  $F(2, 38) = 40.239$ ,  $p = 0.000$ . There were no significant differences between HFA ( $M = 32.316$ ,  $SE = 1.269$ ) and typically developing children on the CARS. These findings are commensurate with expectations for these scales (Gilliam, 2006; Schopler et al., 1988).

Descriptive statistics were explored for gender and age. While the three groups showed similar patterns in terms of gender (i.e. each group consisted of at least 75% male participants), they showed differing patterns for age. For example, while the HFA and TD groups had similar age ranges (3-11 and 2-10 respectively), the LFA group had an age range of 6-13 years. For the reason that the groups were not matched for age, age was not entered into subsequent analyses. Table 4.2 shows the gender and age characteristics of the 3 groups for the 42 participants.

Table 4.2

*Gender and Age Characteristics of the High Functioning Autism (HFA), Low Functioning Autism (LFA) and Typically Developing (TD) Groups*

	Male	<i>n</i>	%	Female	<i>n</i>	%	Mean Age (SD)	Age Range	<i>n</i> = ≤ 6	%	<i>n</i> = 6+	%
HFA		17	85%		3	15%	6.93 (2.09)	3-11	8	40%	12	60%
LFA		7	87%		1	13%	9.2 (2.16)	6-13	0	0%	8	100%
TD		11	79%		3	21%	4.85 (2.35)	2-10	9	72%	4	28%

## **Materials**

Nine assessments, questionnaires and rating scales were used (refer to *Chapter 3* for details). The *BFRS-R* (Green et al., 2007), and the *Sameness Questionnaire* (Prior & MacMillan, 1973) were used to examine sameness behaviour. The *MAS* (Durand & Crimmins, 1992) was used to identify the possible motivational variables maintaining problem behaviours associated with a lack of behavioural flexibility. The *Aberrant Behavior Checklist* (ABC, Aman & Singh, 1994) was used to identify problem behaviours and the *Vineland Adaptive Behavior Scales-Second Edition* (Vineland II, Sparrow et al., 2005) was used to assess adaptive behaviour functioning. The *Short Sensory Profile* (SSP, McIntosh et al., 1999) assessed sensory sensitivity in the children and the *CARS* (Schopler et al., 1988) and the *GARS-2* (Gilliam, 2006) were used to confirm diagnosis. A form for basic descriptive information (see Appendix A) was also used. Each of these assessments has been described in detail in the previous chapter (*Chapter 3*).

## **Procedure**

Survey instruments were distributed to participating parents by mail. Refer to *Chapter 3* for details.

## **Analysis**

Statistical analysis was carried out using the Statistical Package for the Social Sciences (SPSS, Version 19). A total of 42 responses (97.7%) were analysed. Out of these, 20 (47.6%) children were identified as HFA, eight (19%) as LFA and 14 (33.3%) as typically developing. Total raw scores were computed for each

assessment with the exception of the *Vineland-II* (Sparrow et al., 2005), where the adaptive behaviour composite score was used. *SSP* (McIntosh et al., 1999) scores were reversed to allow uniformity across scales. Initially, descriptive statistics (see table 4.3) were conducted for each of the assessments to determine the distribution of scores in order to select the appropriate statistical techniques for further analyses. Descriptive tests indicated that (a) the data was not normally distributed across groups; (b) variances were not equal across groups as evidenced by unequal standard deviations; and (c) sample sizes were unequal. Due to these findings, non-parametric statistics were mainly used.

Table 4.3

*Descriptive Statistics showing Total Scale Scores, Vineland-II Adaptive Behaviour Composite, and SSP Reversed Scores*

Scale	N	Mean	SD	Skew	Kurtosis	Min	Max
Vineland-II	23	84.17	14.82	0.07	0.74	52	115
SSP	42	47.95	28	0.26	-0.6	1	108
ABC	43	37.63	27.48	0.66	-0.68	1	98
MAS	42	35.43	20.55	-0.025	-0.87	0	74
CARS	41	28.24	9.52	0.13	-1.37	15	44
GARS-2	42	35.1	24.08	0.43	-0.84	0	83
BFRS-R	42	18.1	9.75	0.13	-0.53	1	38
Sameness Questionnaire	43	14.95	10.06	0.55	-0.74	1	38

With the purpose of exploring the relationships between the behavioural measures used in the study, Spearman's Rho correlations were performed. In order to determine reliability of the *BFRS-R*, average scores were computed across each of the 16 items. Following this, Kruskal-Wallis non-parametric tests were used to determine group differences on the 16 *BFRS-R* items. With the aim of achieving a complete account of group differences on the *BFRS-R*, Kruskal-Wallis analyses were performed on total *BFRS-R* scores, at the item level, and One-way Analysis of Variance (ANOVA) at the subcategory (Mild, Moderate, Severe) level.

Structural Equation Modelling was used to estimate direct versus indirect effects in relation to whether group position (HFA, LFA, TD) has a direct effect on behavioural flexibility scores on the *BFRS-R*, vs. the strength of the indirect effect of group identity via selected mediating variables (Tabachnik & Fidell, 2001). Three separate analyses examined the effect of mediating variables such as adaptive behaviour (*Vineland-II*), affective responses (*ABC*) and sensory responses (*SSP*) on *BFRS-R* scores. This type of analysis uses regression weights to enable a more functional understanding of the variables involved (Preacher & Hayes, 2004). Prior to this analysis, a series of ANOVAs were performed on the variables to be examined in order to determine how group membership influences the outcome on those scales.

Following the test of indirect effects, Spearman's Rank correlations were performed to explore the relationship between *BFRS-R* (Green et al., 2007) total scores and the subcategories of assessments where an indirect effect was apparent for  $\geq$  two groups. Finally, Kruskal-Wallis tests were performed on each of the *MAS*

(Durand & Crimmins, 1992) categories to determine possible group differences in the function of problem behaviour associated with a lack of behavioural flexibility.

## Results

To explore relations between the behavioural measures used in the study, Spearman's Rank correlations were performed. Correlations for the eight behavioural assessments are presented in table 4.4. There were significant medium to large correlations between most of the scales with the exception of the *BFRS-R* and the *Vineland-II* and the *MAS* and *Vineland-II*. Large correlations are expected between these instruments as they have been developed to measure the characteristics associated with autism and intellectual disability. The lack of association between the *MAS* and the *Vineland-II* may possibly be explained by the impracticability of total scores on the *MAS*. A significant moderate-high ( $r = .652$ ) correlation (Cohen, 1988) was observed between the *Sameness Questionnaire* and the *BFRS-R* verifying convergent validity of the *BFRS-R*.

Table 4.4

*Correlations between the Eight Behavioural Assessments*

Variable	BFRS-R	Vineland -II	ABC	SSP	MAS	Sameness Questionnaire	CARS
Vineland -II	-0.31						
ABC	.75**	-.72**					
SSP	.76**	-.46*	.76**				
MAS	.66**	-0.27	.65**	.64**			
Sameness Questionnaire	.65**	-.49*	.77**	.79**	.53**		
CARS	.63**	-.70**	.83**	.83**	.56**	.81**	
GARS-2	.60**	-.51*	.71**	.75**	.75**	.75**	.79**

\*correlation is significant at the 0.05 level (2-tailed), \*\*correlation is significant at the 0.01 level (2-tailed).

## **Behavioural Flexibility Rating Scale-Revised: Reliability, Validity, and Group Differences**

In order to ascertain reliability of the *BFRS-R*, average scores were determined for each of the 16 *BFRS-R* items. The average score across the 16 items was 1.13 which occurs at the lower end of the “mild problem-moderate problem” range. The average scores for nine items fell within this “mild problem-moderate problem” range. The six items rated as most problematic and falling into the higher end of the “mild problem-moderate problem” range ( $\geq 1.50$ ; range = 1.50-1.76) were: a commonly used object is lost and cannot be found; a person is required to try something new; an object breaks or malfunctions; a planned event is delayed or cancelled; an activity is interrupted; another person is doing something annoying. Three items fell into the lower end of the “mild problem-moderate problem” range ( $\leq 1.49$ ; range = 1.14-1.36). These were: the person makes a mistake; the person is momentarily separated from family/group; materials run out. Seven items fell into the “no problem-mild problem” range ( $< 1.00$ ; range = 0.40 – 0.88). These were: the person is required to move to another location; a new activity is introduced into routine; a usual route is altered; unexpected interaction; an object is moved from its usual position; a new object is added; objects not returned to proper place at the end of an activity. Cronbach’s alpha (Cronbach, 1951) was computed across the 16 items of the *BFRS-R* ( $\alpha = 0.929$ ) showing good internal consistency.

Kruskal-Wallis tests were performed to investigate the hypothesis that there would be differences between group scores on the *BFRS-R*. Adjusted  $p$  values were reported for *BFRS-R* total scores across the three groups. Cases where missing values were present were excluded. The Kruskal-Wallis test found significant



differences between groups on mean *BFRS-R* total ranked scores,  $\chi^2(2, n = 41) = 8.593, p = 0.014$ . Pairwise comparisons revealed no significant differences in *BFRS-R* mean rankings between HFA (23.52) and LFA (27.31) where  $\chi^2(2, n = 41) = -3.788, p = 0.449$ . Mean rankings for the typically developing group (13.23) however, were significantly lower than both the HFA,  $\chi^2(2, n = 41) = 10.294, p = 0.016$ , and LFA group,  $\chi^2(2, n = 41) = 14.082, p = 0.009$  (see Table 4.5).

In order to explore these differences further, Kruskal-Wallis tests were run for *BFRS-R* (mild, moderate, severe) x group to test for differences between *BFRS-R* sub-categories. There were no significant main effects for *BFRS-R* mild,  $\chi^2(2, n = 41) = 0.459, p = 0.795$ , or severe,  $\chi^2(2, n = 41) = 4.789, p = 0.091$ . However a significant effect was evident for the moderate sub-category,  $\chi^2(2, n = 41) = 8.112, p = 0.017$ . Pairwise comparisons were as follows. No significant differences were found between the HFA (*Mean Rank* = 23.78) and LFA (*Mean Rank* = 26.44) groups ( $p = 1.00$ ). However, both the LFA ( $p = 0.043$ ) and HFA ( $p = 0.042$ ) groups recorded significantly greater scores than the TD group (*Mean Rank* = 13.38).

A Kruskal-Wallis test was also performed on each of the *BFRS-R* items (see Table 4.5) revealing significant differences between the ASD groups and typically developing children on 6 items: an event is delayed or cancelled,  $\chi^2(2, n = 41) = 6.535, p = 0.038$ ; an object is moved from its usual position/location,  $\chi^2(2, n = 41) = 10.486, p = 0.005$ ; the person is required to try something new,  $\chi^2(2, n = 41) = 7.568, p = 0.023$ ; an unexpected interaction occurs,  $\chi^2(2, n = 41) = 6.167, p = 0.037$ ; a person is doing something annoying,  $\chi^2(2, n = 41) = 8.571, p = 0.014$ ; a new activity is introduced into the child's routine,  $\chi^2(2, n = 41) = 8.961, p = 0.011$ .

Pairwise comparisons revealed that while there were no differences between the two autism groups (HFA and LFA) on these items, mean *BFRS-R* scores for both HFA and LFA were significantly greater than mean *BFRS-R* scores for the typical controls on all but one (try new) where only the LFA group scored significantly higher than the typically developing group.

Table 4.5

*BFRS-R Mean Rankings across the Three Groups of Children; High Functioning Autism (HFA), Low Functioning Autism (LFA) and Typically Developing (TD)*

Item	HFA	LFA	TD	<i>n</i>	<i>P</i> value	Test statistic	Pairwise comparison
1. Misplaced item	24.15	22.56	15.90	41	0.068	5.836	
2. Event delayed/cancelled	23.28	26.00	14.42	41	0.038	6.535	HFA>TD* LFA>TD*
3. Move to new location	23.52	22.56	16.15	41	0.166	3.592	
4. Object moved	23.10	26.12	12.42	40	0.005	10.486	HFA>TD** LFA>TD**
5. Try new	23.22	26.81	14.00	41	0.023	7.568	LFA>TD*
6. Object breaks/malfunctions	22.38	24.81	16.54	41	0.199	3.231	
7. Routine altered	22.40	21.94	18.27	41	0.564	1.146	
8. Unexpected interaction	23.15	25.75	14.77	41	0.037	6.617	HFA>TD* LFA>TD*
9. Momentary separation	22.18	23.12	17.88	41	0.482	1.459	
10. Materials run out	19.22	28.56	19.08	41	0.113	4.353	
11. Person annoying	24.35	25.19	13.27	41	0.014	8.571	HFA>TD** LFA>TD*
12. Objects not returned	23.25	19.62	18.38	41	0.357	2.058	
13. New object added	21.05	25.25	18.31	41	0.351	2.095	
14. Activity interrupted	22.65	25.06	15.96	41	0.137	3.981	
15. New activity in routine	22.50	28.25	14.23	41	0.011	8.961	HFA>TD* LFA>TD**
16. Mistake	23.70	22.50	15.92	41	0.146	3.845	

\* < 0.05, \*\* < 0.01

## Exploration of the Characteristics involved in Insistence on Sameness

In response to the findings revealing differences between groups on the *BFRS-R*, a test of indirect effects was performed to take into account the possibility that there may be some mediating influence on group outcome. As a basis to the test of indirect effects, analysis of variance (ANOVA) was performed to examine the extent to which group membership might influence outcome scores on each of the assessments used in the forthcoming analysis. Due to missing values, and the differing ranges between scales (see table 4.3), separate one-way between groups ANOVAs were run for the *ABC*, *SSP* and the *Vineland-II*. Levene's tests of Equality of Error Variances demonstrated equal variances across groups for each of the scales. Group membership significantly predicted scores on the *ABC*,  $F(2, 40) = 9.467, p = 0.000$ , *SSP*,  $F(2, 39) = 22.284, p = 0.000$ , and *Vineland-II* adaptive behaviour composite,  $F(2, 20) = 4.520, p = 0.024$ .

Post Hoc tests with Bonferroni adjustment were undertaken with family-wise significance set at the 0.05 level. Post Hoc tests revealed that children in the HFA and LFA groups differed significantly from one another only on the *SSP* ( $p = 0.015$ ). The HFA group demonstrated scores that were significantly different from the typically developing group on the *SSP* ( $p = 0.000$ ), and the *ABC* ( $p = 0.001$ ), but not the *Vineland-II*. The LFA group had scores that were significantly different to the typically developing group on the *SSP* ( $p = 0.000$ ), *ABC* ( $p = 0.008$ ), and *Vineland-II* ( $p < 0.021$ ). Figure 4.1 shows the mean scores for the three groups for each of the three survey scales.

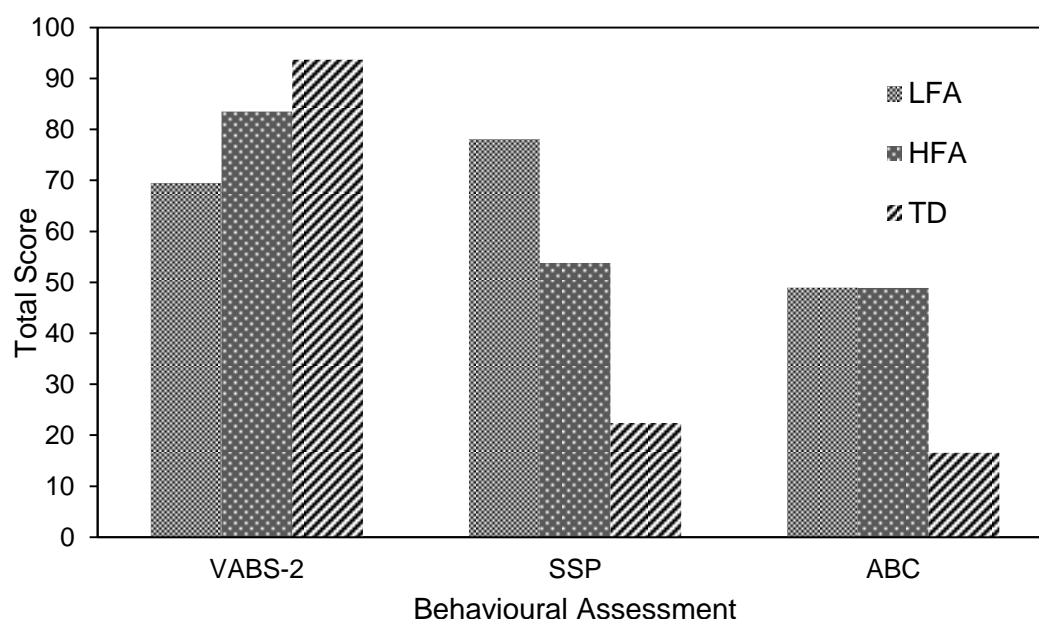
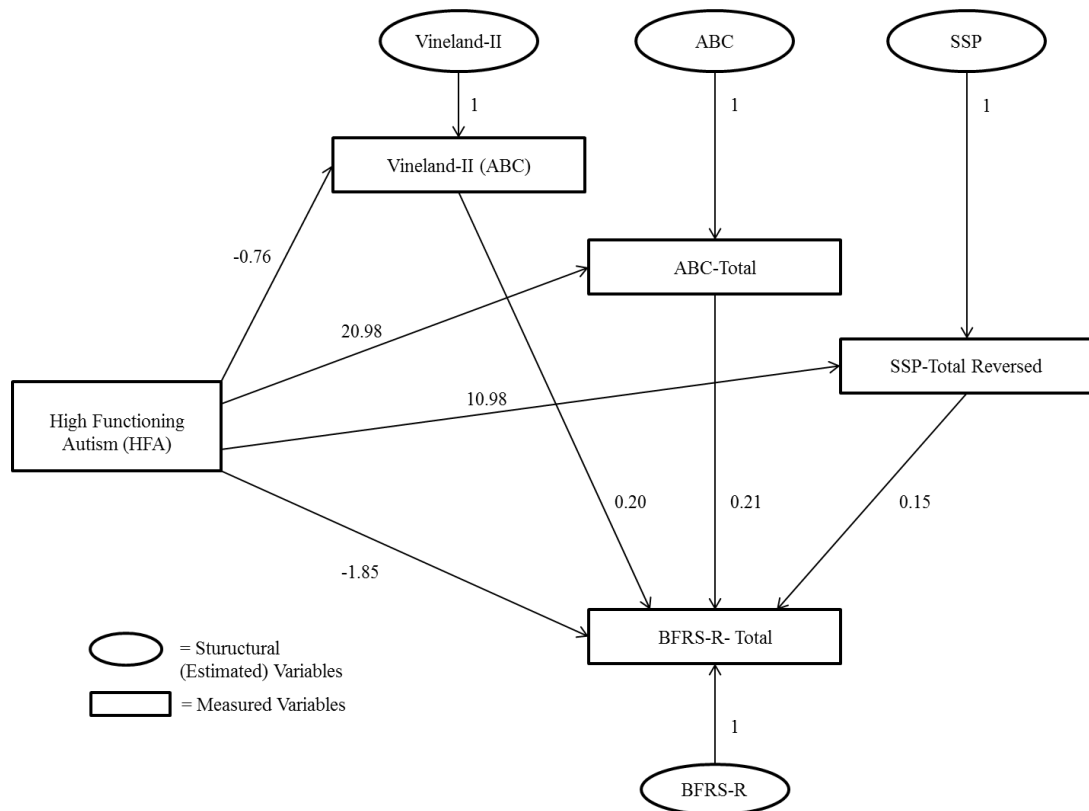


Figure 4.1. Mean scores for the HFA, LFA, and TD groups on the Vineland-II, SSP and ABC.

A test of indirect effects was performed using the independent variable total scores for the *SSP*, *ABC*, and the *Vineland-II* adaptive behaviour composite score. With the exception of the *Vineland-II*, where total responses from participants were 23 (53.5 % of total) there were < 2 missing responses on the other scales, which were replaced by the mean scores for that scale. The group variable IQ category was transformed into three dichotomous variables which represented the absence or presence of the specific sub-groups (HFA, LFA, and TD). SPSS AMOS was used to determine estimates of regression weights in order to compute the direct and indirect effects for each of the three possible mediating variables. Effects were estimated and computed separately for each of the 3 groups and ratios of direct/indirect effects were calculated. Figures 4.2, 4.3, and 4.4 show the path diagrams produced for each group separately to calculate the relative impact of group on *BFRS-R* Scores versus

the same effect expressed via the possible mediating variables (*Vineland-II*, *ABC*, and *SSP*). Ratios of direct/indirect effects for the three groups are presented in tables 4.6 (HFA), 4.7 (LFA), and 4.8 (TD). Conditions in which the indirect effect was greater than the direct effect are highlighted in bold.

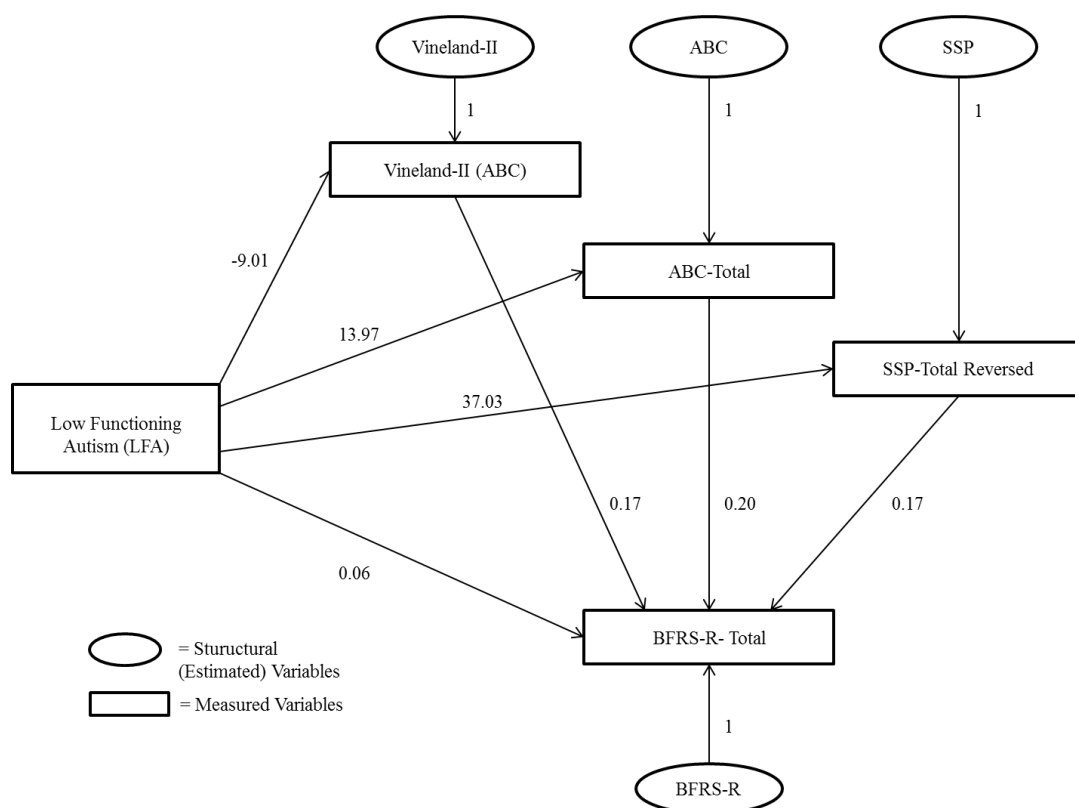


*Figure 4.2.* Path diagram showing the relative influence of the high functioning autism (HFA) group category (Predictor) on BFRS-R scores (Direct Effect) versus the same effect expressed via the Vineland Adaptive Behavior Scales-2<sup>nd</sup> Edition-Adaptive Behaviour Composite (Vineland II-ABC), Aberrant Behaviour Checklist-total (ABC-Total), and Short Sensory Profile-total reversed (SSP-Total Reversed) (Mediating Variable: Indirect Effect).

Table 4.6

*Regression Weights and Direct/Indirect Effects of the Three Possible Mediating Variables on BFRS-R Total Scores for the HFA Group*

Group Category = HFA	Regression Weight		
	Vineland-II	ABC	SSP
HFA → Mediating Variable	-0.76	20.98	10.98
Mediating Variable → BFRS-R	0.20	0.21	0.15
HFA → BFRS-R	-1.85	-1.85	-1.85
Indirect Effect	-0.15	4.41	1.65
Direct Effect	-1.85	-1.85	-1.85
Total Effect	-2.00	2.56	-0.20
Ratio of Indirect/Direct Effect	0.082	<b>-2.382</b>	-0.890



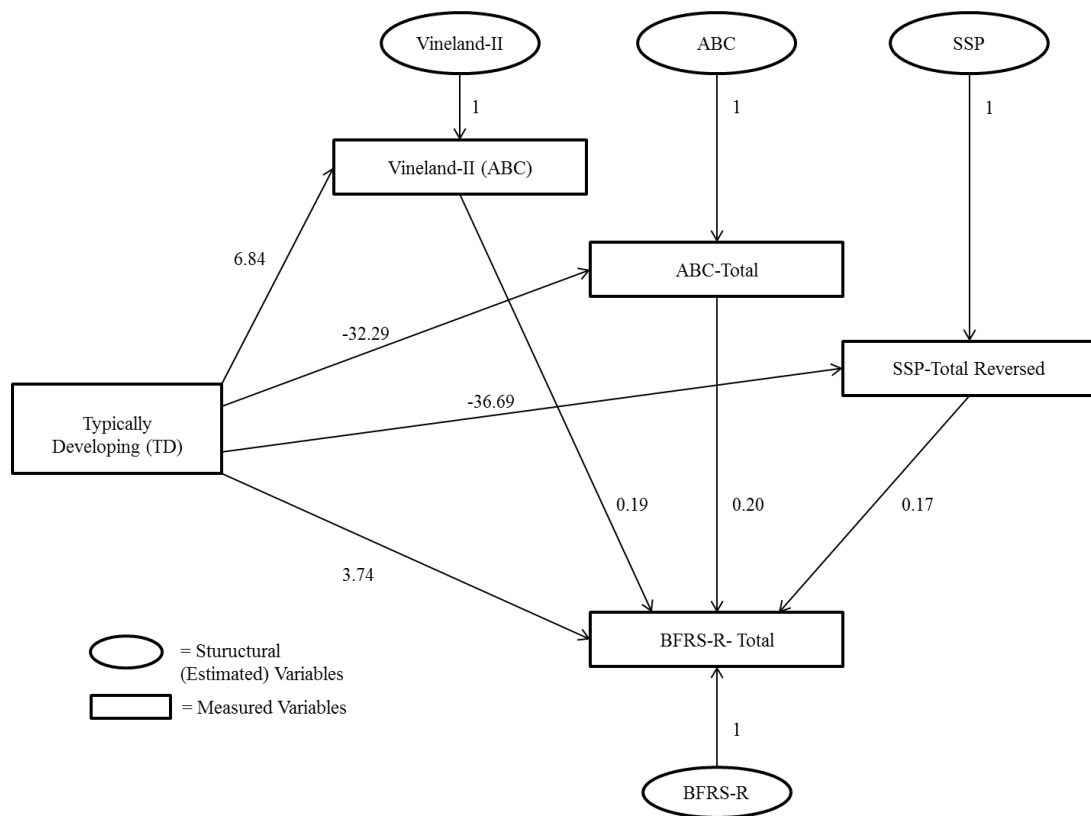
*Figure 4.3.* Path diagram showing the relative influence of the low functioning autism (LFA) group category (Predictor) on BFRS-R scores (Direct Effect) versus the same effect expressed via the Vineland Adaptive Behavior Scales-2<sup>nd</sup> Edition-Adaptive Behaviour Composite (Vineland II-ABC), Aberrant Behaviour Checklist-total (ABC-Total), and Short Sensory Profile-total reversed (SSP-Total Reversed) (Mediating Variable: Indirect Effect).



Table 4.7

*Regression Weights and Direct/Indirect Effects of the Three Possible Mediating Variables on BFRS-R Total Scores for the LFA Group*

Group Category = LFA	Regression Weight		
	Vineland-II	ABC	SSP
LFA→ Mediating Variable	-9.01	13.97	37.03
Mediating Variable →BFRS-R	0.17	0.20	0.17
LFA→BFRS-R	0.06	0.06	0.06
Indirect Effect	-1.53	2.79	6.30
Direct Effect	0.06	0.06	0.06
Total Effect	-1.47	2.85	6.36
Ratio of Indirect/Direct Effect	<b>-25.528</b>	<b>46.567</b>	<b>104.918</b>



*Figure 4.4.* Path diagram showing the relative influence of the typically developing (TD) group category (Predictor) on BFRS-R scores (Direct Effect) versus the same effect expressed via the Vineland Adaptive Behavior Scales-2<sup>nd</sup> Edition-Adaptive Behaviour Composite (Vineland II-ABC), Aberrant Behaviour Checklist-total (ABC-Total), and Short Sensory Profile-total reversed (SSP-Total Reversed) (Mediating Variable: Indirect Effect).

Table 4.8

*Regression Weights and Direct/Indirect Effects of the Three Possible Mediating Variables on BFRS-R Total Scores for the TD Group*

Group Category = TD	Regression Weight		
	Vineland-II	ABC	SSP
TD→ Mediating Variable	6.84	-32.29	-36.69
Mediating Variable →BFRS-R	0.19	0.20	0.17
TD→BFRS-R	3.74	3.74	3.74
Indirect Effect	1.30	-6.46	-6.24
Direct Effect	3.74	3.74	3.74
Total Effect	5.04	-2.72	-2.50
Ratio of Indirect/Direct Effect	0.347	<b>-1.727</b>	<b>-1.668</b>

For HFA participants, the mediating effect of *ABC* score (4.41) was greater than the direct effect of group (-1.85). For LFA all possible mediators, the *Vineland-II* (-1.53), *ABC* (2.79), and *SSP* (6.30) outweighed the direct effect of group membership (0.06). For the typical controls, the mediating effect of *ABC* (-6.46) and *SSP* (-6.24) outweighed the direct effect of group membership (3.74). These results suggest a possible impact of children's adaptive behaviour, level of aberrant behaviour and sensory sensitivity on *BFRS-R* scores over and above their group status derived from IQ ( $<85$ ,  $\geq 85$ ) and diagnosis (ASD, NPD).

Since these findings raise questions about the influence of particular behaviours toward insistence on sameness, further analyses were undertaken to explore particular classes of these behaviours. Following the significant associations

between the *BFRS-R* and the *SSP* (.756) and *ABC* (.748) and the non-significant correlation of (-0.312) between the *BFRS-R* and the *Vineland-II* (see table 4.4), Spearman's rank correlations were only investigated across sub-categories of the *SSP* and *ABC* (table 4.9). Significant associations were observed across all *ABC* subcategories, and all but the Movement Sensitivity sub-scale of the *SSP*.

Correlations were large across all sub-categories of the *ABC*, with the exception of Inappropriate Speech. The largest associations between the *ABC* and *BFRS-R* were demonstrated for the Irritability ( $r = .821$ ), Stereotypy ( $r = .637$ ) and Hyperactivity ( $r = .586$ ) subscales. Large correlations were also demonstrated for most of the *SSP* subscales, however a moderate correlation coefficient was found for the Underresponsive/Seeks Sensation sub-category. The largest associations were found for the Tactile Sensitivity ( $r = .604$ ), Auditory Filtering ( $r = .598$ ), Taste/Smell Sensitivity ( $r = .573$ ) and Visual/Auditory Sensitivity subscales of the *SSP*.

Table 4.9

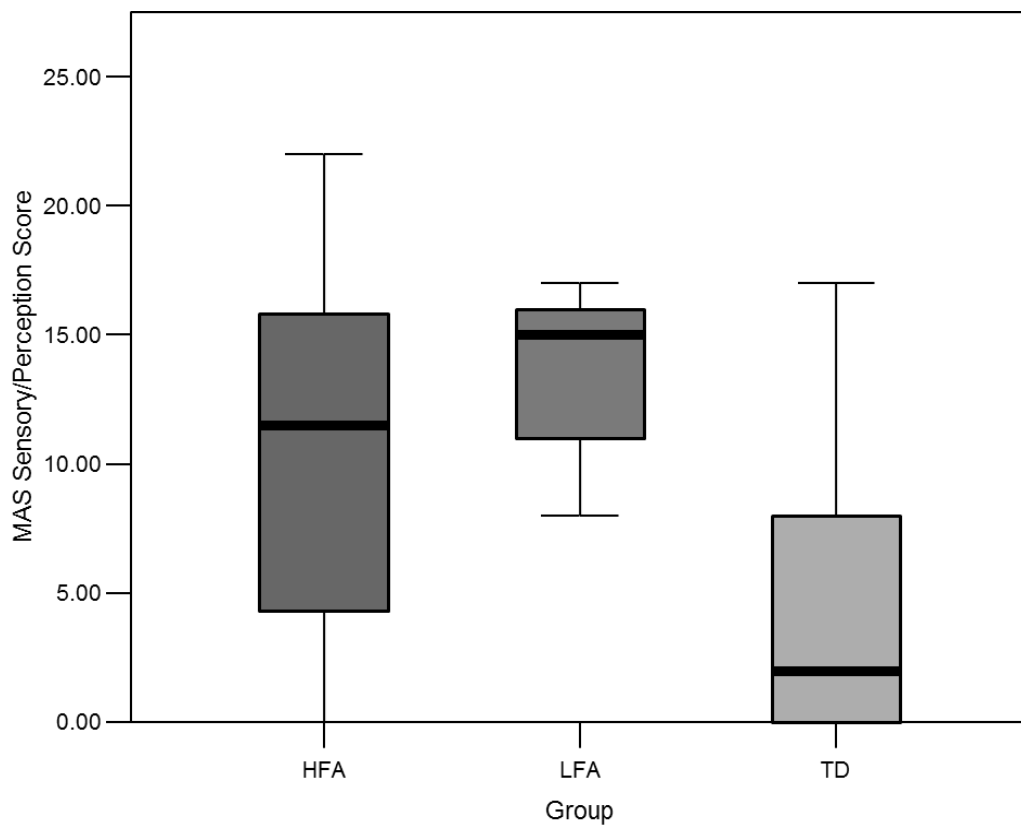
*Correlations between Total BFRS-R Scores and each of the ABC and SSP Subscales*

Sub-category	<i>r</i>	Sig (2-tailed)
ABC		
Irritability	.82	0.000
Lethargy	.52	0.000
Hyperactivity	.59	0.000
Stereotypy	.64	0.000
Inappropriate Speech	.39	0.017
SSP		
Tactile sensitivity	.60	0.000
Taste/Smell Sensitivity	.57	0.000
Movement Sensitivity	.22	0.172
Underresponsive/Seeks Sensation	.42	0.005
Auditory Filtering	.60	0.000
Low Energy/ Weak	.52	0.000
Visual/Auditory Sensitivity	.56	0.000

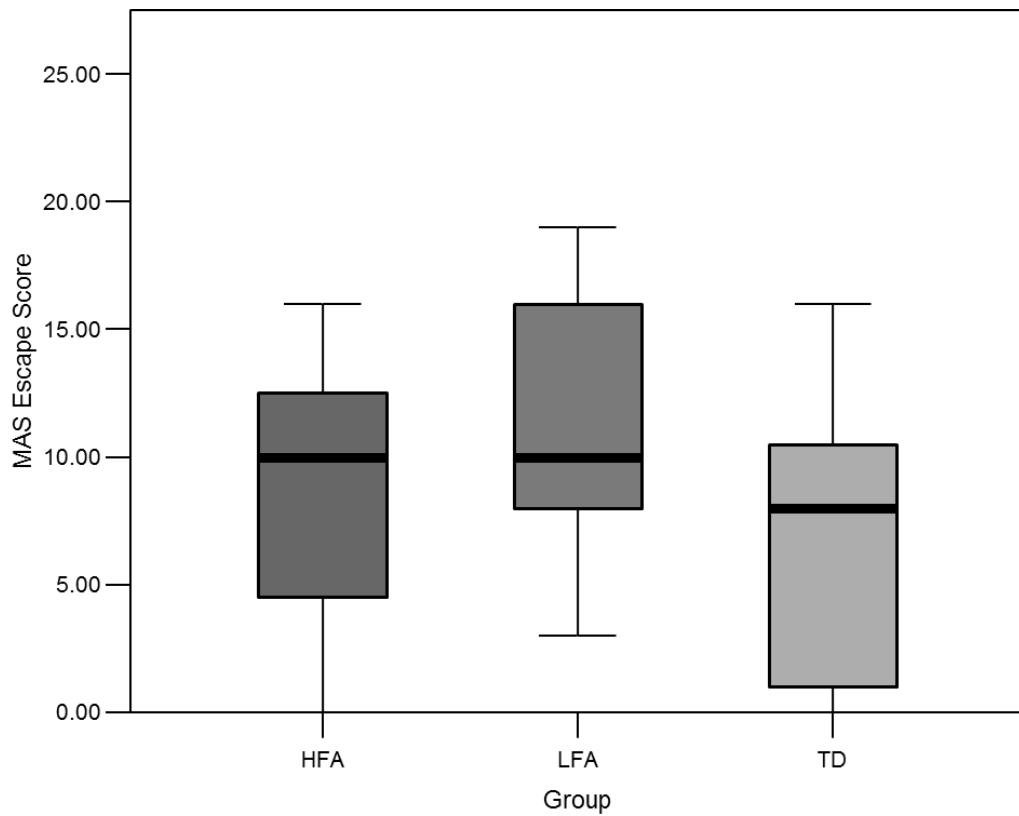
### **Examination of the Function of Insistence on Sameness using the MAS**

In order to determine possible differences in the motivation towards problem behaviour associated with insistence on sameness and resistance to change, Kruskal-Wallis tests were run for each of the *MAS* categories (sensory, escape, tangible, attention). A significant effect was found for the Sensory,  $\chi^2(2, n = 40) = 11.386$ ,  $p = 0.003$ , and attention,  $\chi^2(2, n = 40) = 6.455$ ,  $p = 0.040$ , categories of the *MAS*, but not the escape,  $\chi^2(2, n = 40) = 2.738$ ,  $p = 0.254$  or tangible,  $\chi^2(2, n = 40) = 0.557$ ,  $p = 0.757$  categories. Pairwise comparisons revealed that both of the ASD groups scored significantly higher than the typically developing children for the

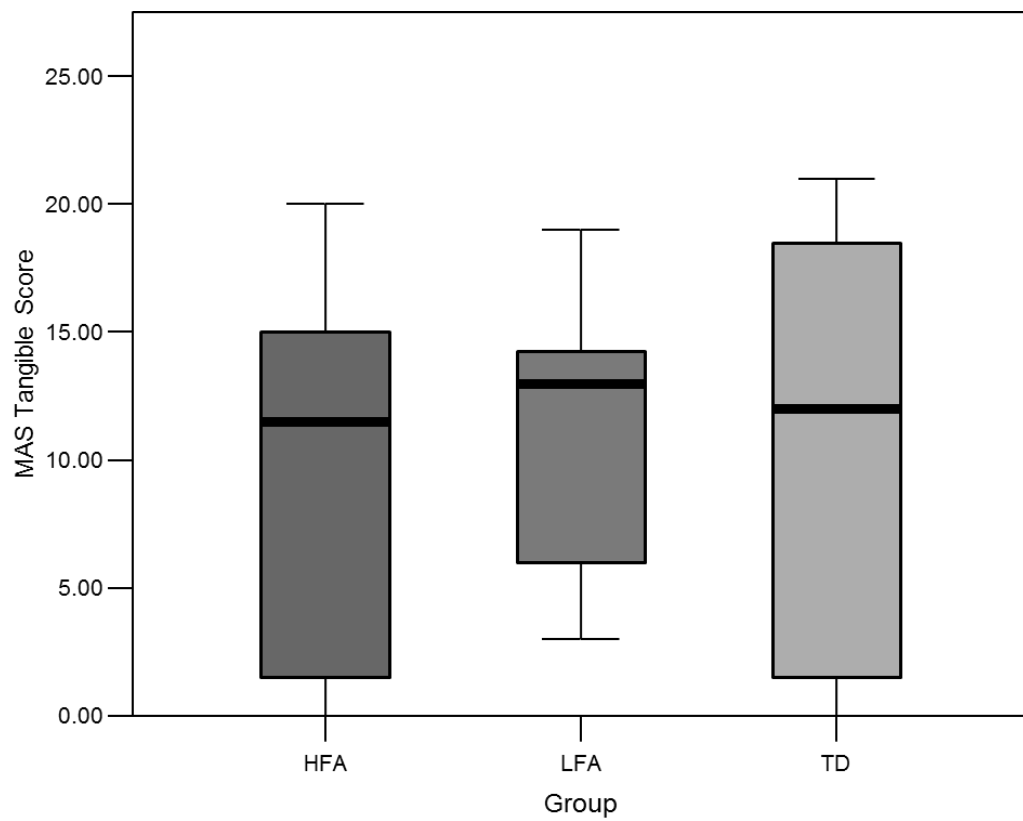
sensory/perception category, and that the LFA children scored significantly higher on the attention category than typically developing children. Figures 4.5-4.8 show the range, median, and percentile scores for each group on each of the four *MAS* categories.



*Figure 4.5.* Minimum, maximum, median, and percentile scores for the Sensory Perception category of the MAS for each of the HFA, LFA and TD groups.

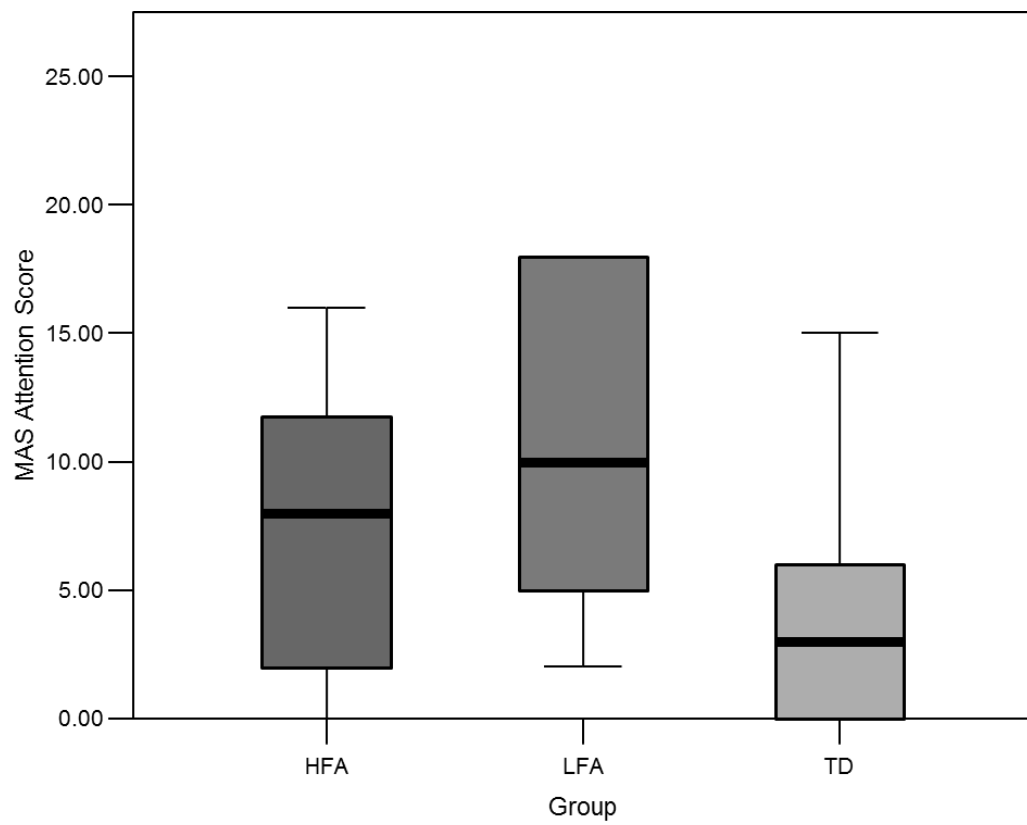


*Figure 4.6.* Minimum, maximum, median and percentile scores for the Escape category of the MAS for each of the HFA, LFA and TD groups.



*Figure 4.7.* Minimum, maximum, median and percentile scores for the Tangible category of the MAS for each of the HFA, LFA and TD groups.





*Figure 4.8.* Minimum, maximum, median and percentile scores for the Attention category of the MAS for each of the HFA, LFA and TD groups.

## Discussion

The results of the current study contribute to the understanding of the characteristics involved in sameness behaviour in individuals with ASD and typically developing children. The results also seem to have implications for the description of sameness behaviour in children with ASD. The main findings of the study are as follows:

- The psychometric properties of the *BFRS-R* appear to be sound. Moreover, distinct items were identified on the *BFRS-R* that may be particularly useful in differentiating between children with ASD and those with typical development.
- As was expected, the results confirmed that insistence on sameness appears to pose significantly greater problems for children with ASD than typically developing children. Moreover, the two ASD groups (HFA, LFA) demonstrated a lack of behavioural flexibility that was equivalent in intensity.
- The differing levels of inflexible behaviour observed in the children with ASD and typically developing children may be influenced by characteristics often associated with ASD over and above group status derived from IQ (HFA =  $\geq 85$ , LFA  $<85$ ) and diagnosis (ASD, NPD).
- Parents in both ASD groups were significantly more likely to report a sensory function for their children's inflexible behaviour than parents of the typically developing children. The LFA group were also more likely to demonstrate an attention function than the typically developing

children. The typically developing children were reported to be equally motivated by a desire to escape a situation or to access tangible items as were the ASD children.

### **Validation of the Behavioural Flexibility Rating Scale-Revised**

The validation portion of the study revealed that the psychometric properties of the *BFRS-R* are sound. The results suggest that the *BFRS-R* is a reliable and valid measure for young children with ASD and young typically developing children aged 2-13. As was expected, the results confirmed that insistence on sameness appears to pose significantly greater problems for children with ASD than typically developing children. Bearing in mind previous findings indicating that typically developing children seem to grow out of this behaviour by about the age of six (Evans et al., 1997), this difference exists despite the high proportion of children below the age of six in the typically developing group (72%) compared to the HFA (40%) and LFA (0%) groups in this study. These results are in line with previous findings (Didden et al., 2008; Green, et al., 2006; Prior & MacMillan, 1973; Zandt et al., 2007). For example, previous work using the *BFRS* (Didden et al., 2008; Green, et al., 2006) and *BFRS-R* (Green, et al., 2007) has indicated greater degrees of inflexibility to the problem situations on the *BFRS-R* in children with ASD than children with other developmental disorders (e.g. Down syndrome, Angelman syndrome, non-specific intellectual disability).

In terms of severity of the problem for the children in the current study, the findings demonstrated significantly greater scores for both ASD groups than the typically developing group on the *BFRS-R* (Green, et al., 2007) ‘moderate problem’

category, with no significant differences between the two ASD groups. No significant differences were found for the *BFRS-R* severe and mild problem categories. These findings raise questions surrounding the relative importance of assessing frequency of the behaviour as well as severity, and highlight a potential limitation to the *BFRS-R*. It may be possible for example, that some children demonstrate only moderate or mild problem behaviours when faced with change, but that the behaviour may occur more frequently, causing as much, if not more disruption as severe reactions that may occur less frequently. Future revisions of the *BFRS-R* should incorporate a measure of frequency at the item level, for example, how often does the behaviour occur: often, sometimes, or never?

There were two additional important outcomes for this study related to findings on the *BFRS-R* (Green, et al., 2007). The first was that the *BFRS-R* was able to discriminate significantly between children with ASD and typical development on a number of items related to a lack of behavioural flexibility in ASD. Six items were found to have the potential for differentiating between children with ASD and those who are typically developing. These items were related to the delay or cancellation of an expected event, an unexpected or unwanted interaction, trying something new, another person doing something annoying, an object being moved from its usual position, and new activities introduced into a usual routine.

Moreover, these six items resemble the highly problematic items observed in individuals with ASD in previous studies utilising the *BFRS* (Didden et al., 2008; Green, et al., 2006) and *BFRS-R* (Green, et al., 2008). More specifically, utilising the *BFRS*, Green et al. (2006) reported annoying behaviour as a highly problematic situation for children with Asperger syndrome. Annoying behaviour was also one of

the highest scoring problem situations for the children with autism in their study, with the delay or cancellation of an event receiving the highest score. Using 11 items of the *BFRS*, Didden et al. (2008) showed that for children with autism annoying behaviour appeared to be one of the most problematic situations, followed by the delay or cancellation of an event and a change in routine. Green et al.'s (2008) play-based assessment revealed that unexpected interactions and routine changes as well as objects being added to the environment caused the most frustration for the children with Asperger syndrome in their study. Whereas misplaced objects, trying new activities and routine changes caused the most frustration for a young child with autism.

When combining the findings of these studies with the findings in this thesis there appear to be three main situations that may perhaps be helpful in distinguishing children with ASD from children with other developmental disabilities, and those who are typically developing. These are:

- Another person is doing something annoying (e.g. making a loud noise).
- The delay or cancellation of an event.
- An unexpected or unwanted interaction.

It appears to be possible therefore, that some of the *BFRS-R* problem situations may convey idiosyncratic behaviours in children with ASD. This may have important implications towards the use of assessment tools that encompass only a small number of items related to insistence on sameness. For instance, it would seem that fewer items may limit the potential for an accurate description of the

possible idiosyncrasies in this behaviour in children with ASD. Therefore the verification of these possible discriminating items is an imperative.

A further interesting finding related to *BFRS-R* outcomes is that items that received the uppermost scores for each of the three groups seem to align with particular components of the *BFRS-R* that were established for children with autism and Asperger syndrome in a factor analysis study by Pituch et al. (2007), as well as current notions surrounding inflexible behaviour in typically developing children (Evans et al., 1997). For example, two items that received high scores for the HFA children in the study reflect the ‘interpersonal mishaps’ factor identified to be associated with the children with Asperger syndrome in Pituch et al.’s study; that is item (11), when someone is doing something annoying, and item (16), when a mistake is made while engaged in an activity/task.

The four items receiving the highest ranking in the LFA group appear to reflect the interruption/disruption component of behavioural flexibility identified by Pituch et al. (2007); when materials run out causing a premature end to an activity (item 10), followed by item (15) when a new activity is introduced into a usual routine, item (5) when the child is required to try something new, and item (2) when a planned event is delayed or cancelled.

For the typically developing group, there were three high scoring items that represent the position/location factor identified by Pituch et al. (2007); item (12) when objects/materials are not returned to their proper place, item (13) a new object is added to the environment, and item (7) when a usual routine is altered.

Interestingly, these items also seem to reflect the ‘just right’ phenomena commonly observed in early typical development (Evans et al., 1997; Glenn et al., 2012).

Though there appeared to be some minor overlap for some items, this observation indicates that Pituch et al.’s (2007) factor analytic study reflecting particular aspects of sameness behaviour (e.g. interpersonal mishaps, interruption/disruption, position/location) may have exposed defined idiosyncrasies in sameness behaviour between children with ASD, those with other developmental disorders and children who are typically developing, that warrant further investigation.

When considering these findings together, it appears that sameness behaviours in children with ASD may additionally reflect the social and communication deficits observed in these children (American Psychiatric Association, 2000), whereas in individuals without the disorder the behaviour may be more reflective of developmentally appropriate compulsive behaviour and perfectionism (Evans et al., 1997). For example, It may be possible that the inflexible behaviour observed in typically developing children and those with other developmental disorders might better correspond to the ‘just right’ phenomena often observed in typically developing children during the early years (Evans et al., 1997; Glenn et al., 2012). While the inflexible behaviour observed in ASD may also reflect this phenomena, there appears to be another, perhaps more complex level of these behaviours for these children.

## **Behavioural Flexibility as a Function of ASD Severity**

According to Turner's (1999) hypothesis, it was predicted that children with HFA would be less flexible than their LFA counterparts; however this was not observed in the current study. In contrast, it was found that there were no differences for insistence on sameness and resistance to change between HFA and LFA individuals. These findings are in line with those of Militeri et al. (2002) who also found no differences for insistence on sameness and resistance to change between low and high intelligence groups. Previous comparisons of HFA individuals and LFA individuals have been mixed between reports of greater flexibility in LFA (Cuccaro et al., 2003; Green, et al., 2007; Green, et al., 2006; Szatmari et al., 2006) and others reporting greater flexibility in HFA (Bartak & Rutter, 1976; Gabriels et al., 2005).

As discussed in *Chapter 2*, this discrepancy in findings may reflect the differing methods used to identify groups for comparison, for example, diagnosis/cognitive function. Another possible explanation for the conflicting findings is inconsistencies in the observations of the behaviour. That is, there may be important differences in the measurements used (Leekam et al., 2007). Recall that in *Chapter 2*, substantial differences were outlined in the consideration of behavioural flexibility across assessment scales. While some scales contain a relatively small threshold of items related to insistence on sameness and resistance to change, for example the *Autism Diagnostic Interview-Revised* (ADI-R, Lord, et al, 1994), others, for example the *Childhood Routines Inventory* (CRI, Evans, et al., 1997) and the *Repetitive Behavior Scale-Revised* (RBS-R, Bodfish, et al., 2000) are more related to compulsive-like behaviours. Moreover, while some studies have examined the



frequency of the behaviour (Cuccaro et al., 2003; Szatmari et al., 2006), others examined severity (Didden et al., 2008; Green, et al., 2006). These inconsistencies across studies emphasise an important challenge for future research examining characteristic differences in individuals with ASD. That is to use compatible measures, and an agreement regarding delineation of ASD subtypes.

### **Characteristics of the Behaviour: Mediating Effects**

A chief finding of this study was the discovery that there may be some intermediary factors that influence the problem behaviours associated with insistence on sameness in children with ASD. For example, it was found that for both the children with HFA and LFA, insistence on sameness may be mediated by high levels of aberrant behaviour. For children in the LFA group, it also appears that sensory sensitivities and adaptive behaviour may influence behavioural flexibility.

These findings may be explained in a number of ways. For example, the finding of a mediating effect for adaptive behaviour appears to fall in line with Green et al.'s (2008) notion that deficits in adaptive behaviour may produce insistence on sameness by default. However, weak correlations and small numbers of participants completing the *Vineland-II* suggest that these results should be interpreted with caution. The lack of association demonstrated in the high functioning group has been shown previously. For example, no significant associations were found between adaptive behaviour using the adaptive behaviour composite of the *Vineland Adaptive Behavior Scales* (Sparrow et al., 1984) and insistence on sameness measured using the *ADI-R* (Lord et al., 1994) in a larger-scale study by Cuccaro et al. (2003). On the other hand, the mediating effect of problem behaviour may reflect deficits in

emotion regulation, an aspect of adaptive behaviour, with reactions to change borne out of a compulsive desire to express the frustration, or confusion surrounding change (Ozonoff et al., 2005). These findings will need to be investigated further.

The finding of the mediating effect of sensory behaviours in the low functioning children is in line with the findings of Militeri et al. (2002). In their study, Militeri et al. used a semi-structured questionnaire deriving questions from a number of instruments. Using the *Yale-Brown Obsessive Compulsive Scale* (W. K. Goodman et al., 1989), *CARS* (Schopler et al., 1988), *ABC* (Aman & Singh, 1994), and the *Stereotyped Behavior Scale* (Rojahn et al., 1997), they found that repetitive behaviours with sensory goals were evidenced in children with lower IQs. It has also been suggested that stereotyped behaviours are the result of sensory processing dysfunction, such that children with ASD carry out the behaviours in an attempt to make sense of the world (Baker, Lane, Angley, & Young, 2008; Baranek, Boyd, Poe, David, & Watson, 2007; Lovaas et al., 1987). It is possible then that, in much the same way, some children with ASD insist on sameness in an attempt to maintain a particular perceptual state that is familiar and calming.

Though mediating effects on total *BFRS-R* scores were evident for different associated symptoms across the two ASD groups in this study, it is not clear how they may be linked to each of the *BFRS-R* scenarios separately. Indeed, Evans and Gray (2000) suggested that while some compulsive-like behaviours may serve an adaptive function, others may be indicated by psychopathological involvement. It is also unclear which aspects of these scales may have the most influence on the behaviour.

Correlational analyses were carried out on the *SSP* and *ABC* to expand on the findings. High positive associations between the *BFRS-R* and the *SSP* and *ABC* were investigated further by subcategory for these scales. The results demonstrated that particular sensory and/or affective responses may be more related than others to problem behaviours associated with insistence on sameness and resistance to change in children.

For example, on the *ABC*, Irritability, Stereotypy and Hyperactivity had the largest associations. According to Hessler and Katz (2007), irritability and hyperactivity reflect an under-control in emotion regulation. As such these aspects of affective behaviour may perhaps reflect the exasperation, frustration, and emotionally reactive behaviour often observed in children with ASD (Hartley et al., 2008).

On the *SSP*, Tactile Sensitivity, Auditory Filtering and Taste/Smell Sensitivity had the largest associations. The Auditory Filtering subscale on the *SSP* assesses the ability to screen out sounds in every-day situations (McIntosh et al., 1999). It is possible then that deficits in this sensory response contribute to the frustration observed when someone is doing something annoying. Another possibility is that difficulties with touch processing in children with ASD (Smith-Myles et al., 2004) may contribute to a dislike of trying new clothes, or insisting on wearing the same (perhaps more comfortable) clothes every day. In addition, an atypical response to taste and smell experiences (McIntosh et al., 1999) may impact the sampling of new foods. These findings also lend further support to the idea that an insistence on sameness and/or resistance to change may reflect a preferred

sensory/perceptual experience for individuals with ASD (Evans & Gray, 2000; Lovaas et al., 1987).

It is important to note that these findings are limited to ratios of direct and indirect effects based on measures taken from parent report, and should thus be interpreted with caution. It is also uncertain whether the findings were influenced by item overlap between the scales. Nevertheless, they indicate that there may be particular underlying characteristic differences that may differentiate high and low functioning autism in relation to behavioural flexibility that was not able to be determined by total *BFRS-R* scores alone.

The finding that sensory behaviours were not found to have a mediating effect on *BFRS-R* scores for the HFA children, is in contrast to the findings indicating a predominance for the HFA children to be motivated by sensory/perceptual factors associated with insistence on sameness on the *MAS*. One possible explanation for this discrepancy may lie in the selection of assessments to measure this behaviour. For example, the *SSP* was selected to minimise participant fatigue in completing questionnaires in preference to the more comprehensive *Sensory Profile* (Dunn, 1999).

It is possible that the *SSP* may not have provided an adequate summary of the behaviour for the HFA children in this study. Indeed, Smith-Myles et al. (2004), found sensory processing differences between children with autism and children with Asperger syndrome that reinforce this possibility. For example, Smith-Myles et al. found that children with Asperger syndrome had significantly more difficulties on emotional/social responses and the emotionally reactive factor of the *Sensory*

*Profile.* According to Dunn (1999) these items reflect “psychosocial coping strategies” and include items which identify difficulties, for example, with failure, mistakes, tolerating changes in plans, routines and expectations, frustration, tolerance, stubbornness, and anxiousness.

It is evident that more work will be required, to tease out these effects, for example to particular behaviours represented by these scales. Moreover, studies aimed at examining these findings in more detail must endeavour to use a comprehensive assessment of adaptive, problem and sensory behaviours. A further objective of these studies should be to understand how particular characteristic impairments in ASD interact (Leekam et al., 2011) to produce insistence on sameness and resistance to change.

### **Characteristics of the Behaviour: Functional Assessment**

Comparison of group scores on the *MAS* revealed that the children with both HFA and LFA revealed more sensory motivations for insistence on sameness and resistance to change than the typically developing children. These results further suggest that there may be some notable sensory/perceptual involvement in the behaviour for children with ASD. This finding is similar to the findings of O'Reilly et al. (2010) and Reese, Richman, Belmont, and Morse's (2005) functional assessment studies, where the motivation of problem behaviour was mainly maintained by sensory consequences in children with ASD. The children with LFA also demonstrated more attention motivations than the typically developing children. This finding is expected, as attention has been reported as one of the most common functions of a range of problem behaviours for individuals with developmental

disabilities (Carr, & LeBlanc., 2003; Hanley et al., 2003). Notably, if we consider that an attention function may be treated by functional communication training, and as such is possibly related to an inability to use appropriate strategies such as requesting help, then this finding may be related to the lower proficiency for language observed in LFA individuals (American Psychiatric Association, 2000). Future work should therefore include a measure of language functioning.

The results of the study also showed that the typically developing children were reported to be equally motivated by a desire to escape a situation or to access tangible items as were the ASD children. Visual inspection of the data shows that the desire for access to tangible items was the most commonly reported function of insistence on sameness for typically developing children differing by only one point from each of the ASD groups. Winter and Schreibman (2002) suggested that the function of problem behaviour associated with a lack of behavioural flexibility might begin following similar patterns for typically developing children and those with ASD, but as the behaviour continues over time for the children with ASD, it may begin to serve different functions.

As age was not able to be factored into this analysis, it is still unclear whether Winter and Schreibman's (2002) view is accurate. However, as it stands, the data presented suggests that for the children with ASD in this study (aged 3-13), inflexible problem behaviour may be more commonly associated with sensory/perceptual and attention functions in contrast to the typically developing children (aged 2-10), who were perhaps more likely to be motivated by the desire for access to tangible items. These findings highlight a possible distinction between the function of some sameness behaviours for children with ASD and children who are

typically developing. However, further research is needed to confirm these findings across differing age groups.

Aside from the strengths and weaknesses of the study mentioned above, there were a number of additional limitations, and as such the data should be interpreted with caution. Firstly, the findings of this study were limited by the small sample size. A larger sample size would have increased the reliability and generality of results, especially where it was demonstrated that no differences were evident when differences had been hypothesised. Additionally, age was not able to be factored into the current analysis due to uneven ages across groups. A larger sample size may also have rectified this problem.

Secondly, though the *CARS* and *GARS-2* were useful in verifying the diagnostic status of children with and without ASD, these scales were not able to produce a clear-cut distinction between children in the high and low functioning ASD groups to verify groups based on IQ. Though, the utilisation of IQ scores above and below particular cut off points ranging from around 65 (Szatmari et al., 2006) to 80 (Schopler, Van Bourgondien, Wellman, & Love, 2010) are reasonably common procedures, the limitation here was that the current study identified these cut off points according to parent report only, which may have been incorrect or biased. Thirdly, the study relied solely on parent/caregiver report on questionnaires, which may be influenced by a number of factors. Answers may be influenced, for example, by the number of occasions available to the parent/caregiver for the observation of the behaviour (Green, et al., 2008), and the parent's own understanding of the information and interpretation of questions. Finally data for only half of the

participants was collected regarding adaptive behaviour, further limiting the findings on this particular characteristic.

In conclusion, the study provided further validation of the psychometric properties of the *BFRS-R* (Green et al., 2007) with results that showed internal consistency and convergent validity. Moreover, the *BFRS-R* was able to differentiate between children with autism and typically developing children on a number of problem situations associated with an insistence on sameness and resistance to change. In addition to these findings, an important aspect of the *BFRS-R* was indicated for future attention. That is, in order for the *BFRS-R* to increase its applicability for comparison to studies (including those examining the frequency of the behaviour), future revisions should include a measure of frequency.

Further work is needed to substantiate the inference that particular situations (i.e. another person is doing something annoying, the delay or cancellation of an event, an unexpected or unwanted interaction) may represent characteristic traits associated with insistence on change in children with ASD. In addition to this future studies should investigate whether potential categories of insistence on sameness, for example interpersonal mishaps, interruption/disruption, position/location (Green, et al., 2007; Pituch et al., 2007) communicate idiosyncrasies in sameness behaviour between children with ASD, those with other developmental disorders and children who are typically developing.

Future work must also aim to involve greater numbers of participants, and if possible match for age, IQ, and diagnostic status. It would therefore be important to incorporate a gold standard diagnostic assessment (e.g. the ADI-R, Lord et al., 1994)



as well as a measure of IQ that is carried out by a clinician or a qualified researcher. It would also seem highly practical for researchers carrying out investigations involving individuals with ASD to have consistency among groups for comparison across studies.

Finally, the study highlighted a possible distinction in the function of problem behaviour associated with insistence on sameness and resistance to change between children with ASD and typically developing children. That is, children with ASD may be more likely to be motivated by non-social reinforcement than typically developing children. Moreover, particular sensory responses may be linked to this behaviour in children with ASD. For example, an inability to screen out sounds may lead to the frustration observed at loud noises made by others, and tactile sensitivity might produce a desire to wear the same clothes, or eat the same foods every day. The study also revealed a number of affective responses that may be associated with an under-control of emotion regulation, however further work is needed to clarify these findings.

## Chapter 5

### **Study 2. Functional Analysis of Insistence on Sameness in an 11-year old boy with Asperger Syndrome<sup>2</sup>**

#### **Overview**

Insistence on sameness is characteristic of persons with autism spectrum disorders, but there has been little research related to its functional properties. This chapter outlines a functional analysis study of an 11-year old boy (Alex) with Asperger syndrome. The functional analysis was adapted around a play-based assessment developed by Green et al. (2008) using scenarios derived from the *Behavioural Flexibility Rating Scale-Revised* (BFRS-R, Green, et al., 2007). Alex was observed during play where scenarios (mistakes, misplaced items, interrupted activity) were created to correspond with parent reported scenarios where the child would insistence on sameness. The extent of problem behaviour was observed under four functional assessment conditions (restore environment, tangible, attention, escape), according to a multi-element design. The study established a novel approach to the functional assessment of insistence on sameness and resistance to change, which can be applied to intervention employing strategies such as functional communication training, and instruction focussing on teaching problem-solving skills and tolerance for change.

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<sup>2</sup> This chapter has been published: Ollington, N., Green., V. A., O'Reilly, M.F., Lancioni, G.E., & Didden, R. (2012). Functional Analysis of Insistence on Sameness in an 11-year old boy with Asperger Syndrome, *Developmental Neurorehabilitation*, 15 (2), 154-159.

## **Introduction**

As described earlier, children with autism spectrum disorder (ASD) often appear inflexible in their behaviour as evidenced by a seemingly obsessive insistence on the maintenance of sameness and resistance to change (Kanner, 1943; Turner, 1999). Among children with ASD, insistence on sameness and resistance to change often seem to occur in response to unexpected changes to the environment or established routines (Green, et al., 2006). When faced with a change in the physical environment or an established routine, children with ASD often respond with behaviour that is seemingly an attempt to restore the environment to its previous state or with behaviour that appears to be an attempt to re-establish the familiar routine. When thwarted in these attempts, the child may become visibly upset, cry, and/or engage in other problem behaviour, such as aggression or self-injury (Brereton et al., 2006; Matson & Dempsey, 2009; Sukhodolsky et al., 2008; Turner, 1999). Given the prevalence of insistence on sameness among children with ASD and its potential negative social impact, there would seem to be some value in identifying motivational variables that might influence insistence on sameness and resistance to change among children with ASD.

Along these lines, Green et al. (2008) developed a play-based assessment to identify situations that evoked attempts by the child to insist on sameness or resist change. While Green et al.'s protocol appeared promising for identifying antecedent conditions that set the occasion for insisting on sameness or resisting change, the protocol was limited in that it did not include any assessment of the motivational consequences, if any, that might have been maintaining the child's insistence on sameness and resistance to change.

To this end, Iwata et al. (1982/1994) described an assessment procedure for identifying the motivational consequences that maintain problem behaviour among individuals with developmental disabilities. The procedure involved recording the frequency of problem behaviour under different experimental conditions. Typically, the conditions are: (a) attention, (b) escape, (c) tangible, and (d) an alone condition. To test for an attention motivation, for example, the individual is ignored, but then given brief periods of attention contingent upon the occurrence of problem behaviour. High rates of problem behaviour in this condition suggest that problem behaviour is maintained by the resulting attention. To test for an escape motivation, in contrast, the individual is presented with a demanding task, but then given brief periods of escape from the task contingent upon problem behaviour. High rates of problem behaviour in this condition suggest that the problem behaviour is maintained by the resulting escape from task demands. For the tangible test, the individual is required to wait before receiving a preferred object, but is then given access to the object contingent upon problem behaviour. High rates of problem behaviour in this condition suggest that problem behaviour is maintained by gaining access to preferred objects. Finally, in the alone condition, the individual is left alone to determine if problem behaviour is maintained by automatic reinforcement in the form of sensory stimulation.

While this assessment procedure has been widely used to identify the motivation of a range of problem behaviours (e.g., aggression, self-injury, tantrums) among individuals with ASD (O'Reilly et al., 2010), there appear to be no studies that have aimed to identify the motivational properties, if any, of problem behaviours that occur in response to situations that appear to set the occasion for insisting on

sameness or resisting change. The purpose of the present study was to undertake such an assessment with an 11-year-old boy who was reported to frequently insist on sameness and resist change (a) when he made a mistake during an activity, (b) when a commonly used object was missing, and (c) when an activity was interrupted. The child was exposed to these situations or scenarios while receiving either attention, escape, tangible, or restorative consequences contingent upon problem behaviours that arose when the scenarios were created. The reason for exposing the child to the latter conditions was to determine if his behaviours, that seemingly indicated an attempt to insist on sameness and/or resist change, were maintained by attention, escape, or tangible consequences or by restoration of the environment to its pre-change state.

## **Method**

### **Ethical Approval and Informed Consent**

Ethical approval was obtained by the Human Research Ethics Committee (Tasmania) Network (Appendix B) and informed consent had been provided by the child's mother. Verbal consent was also provided by the child following explanation of the play procedure (excluding manipulations).

### **Participant**

The participant (Alex) was an 11-year-old boy with Asperger syndrome. His IQ was reported to be 115. On the second edition of the *Vineland Adaptive Behavior Scales—2<sup>nd</sup> Edition* (Vineland-II, Sparrow et al., 2005), Alex received age equivalencies in the Communication subdomain of 4:7 (years: months), 8:0 and 17:9

for receptive, expressive, and written language skills, respectively. For the Socialization subdomain, he received age equivalencies of 6:5, 8:3, and 9:6 for interpersonal relationships, play and leisure, and coping skills, respectively. On the *Aberrant Behavior Checklist - Community* (ABC-C, Aman & Singh, 1994) he received a total score of 24 indicating moderate levels of problem behaviour. His problem behaviours included tearfulness, crying, anxiousness, agitation, and raising his voice

### **Setting, Context, and Sessions**

The procedures were implemented in the living room and backyard of the child's home. To identify scenarios associated with insistence on sameness and resistance to change, we first administered the *Behavioural Flexibility Rating Scale-Revised* (BFRS-R, Green, et al., 2007). The *BFRS-R* is used to rate the extent to which specific situations, or scenarios, cause a problem for the person. For example, when a planned event is delayed or cancelled, the parent is asked to rate whether this is likely to cause (a) no problem, (b) a mild problem, (c) a moderate problem, or (d) a severe problem. These ratings were made using a Likert-type scale ranging from 0 (no problem) to 3 (severe problem). Three situations, reported by Alex's mother to cause problem behaviour were selected as the scenarios for this study. These were (a) Alex makes a mistake during an activity, (b) a needed object is misplaced, and (c) the activity was interrupted. These scenarios were created during a naturalistic play routine following an initial period of time (baseline) when no such manipulations were created.

The study was conducted in sessions that each lasted 30 min, during which Alex participated in a play routine. Two of the three scenarios were created once per session for a total of two manipulations per session. Ten, 30-min sessions (inclusive of four sessions involving no manipulations or baseline) were completed over a 5-week period.

### **Response Definition and Measurement**

Alex's level of problem behaviour was classified into four levels of severity: At the first level was appropriate responding, which was indicated when Alex did not engage in any problem behaviour. The next level was used for mild problem behaviour, which was defined as complaining, whingeing, or verbally protesting. Moderate problem behaviour was defined as foot stomping yelling/shouting, and/or throwing items. Problem behaviour was defined as severe if Alex engaged in tantrums involving aggression or self-injury. The severity of behaviour was recorded according to the uppermost level of severity observed during 30-s intervals that occurred prior to, during and after exposing Alex to each of the three scenarios (see Procedures) and under the four functional analysis conditions (i.e., attention, restore environment, escape, and tangible) that were embedded within each scenario. For example, if Alex displayed both whingeing (mild problem behaviour) and shouting (moderate problem behaviour) in one 30-s interval, the behaviour was recorded as moderate.

### **Functional Analysis**

Four conditions, representing four possible motivating factors (i.e., attention, escape, restore environment, and tangible) were arranged in a multi-element design

based on the procedures described by Iwata et al. (1982/1994). In the attention condition, Alex was provided with verbal (e.g. 'everything is ok') and/or physical contact (e.g. a pat on the back) contingent upon an occurrence of problem behaviour irrespective of severity. During the escape condition, Alex was allowed to leave the play situation or move on to another game contingent upon an occurrence of problem behaviour. The restore environment condition allowed the situation to return to its previous state. For example, if an item was missing, the item was restored contingent upon an occurrence of problem behaviour. In the tangible condition, a preferred object, which was visible to Alex, was made available contingent upon an occurrence of problem behaviour.

A direct preference assessment was completed prior to the study to identify preferred objects for the tangible condition. Toys, food, and sensory items reported by Alex's mother as favoured by Alex were offered over two sessions. Nine items in total were presented successively (54 presentations at each session) for 30-s each. Preference for the item was recorded (Yes), if the child picked up the item and responded to it for at least 5-s (No) if the child did not pick up the toy, or did not respond to it for at least 5-s during each 30-s interval. Inter-rater agreement was recorded for 50% of the presentations (i.e. over one session) and there was 100% agreement. The independent observer was a PhD candidate with experience in behavioural methods of observation, including the current preference assessment. The order and combination of scenarios and functional analysis conditions were counterbalanced and randomly allocated using a random number generator.

Alex was permitted to choose up to four play activities within each session. Play was carried out in two parts, as in Green et al.'s (2008) study. In Part 1



(Baseline), Alex played freely and none of the three scenarios for evoking insisting on sameness or resisting change were created. The severity of any instances of problem behaviour was recorded for the duration of these four 30-min sessions. In Part 2, the three scenarios for evoking insistence on sameness or resistance to change were created under attention, tangible, escape, and restore conditions.

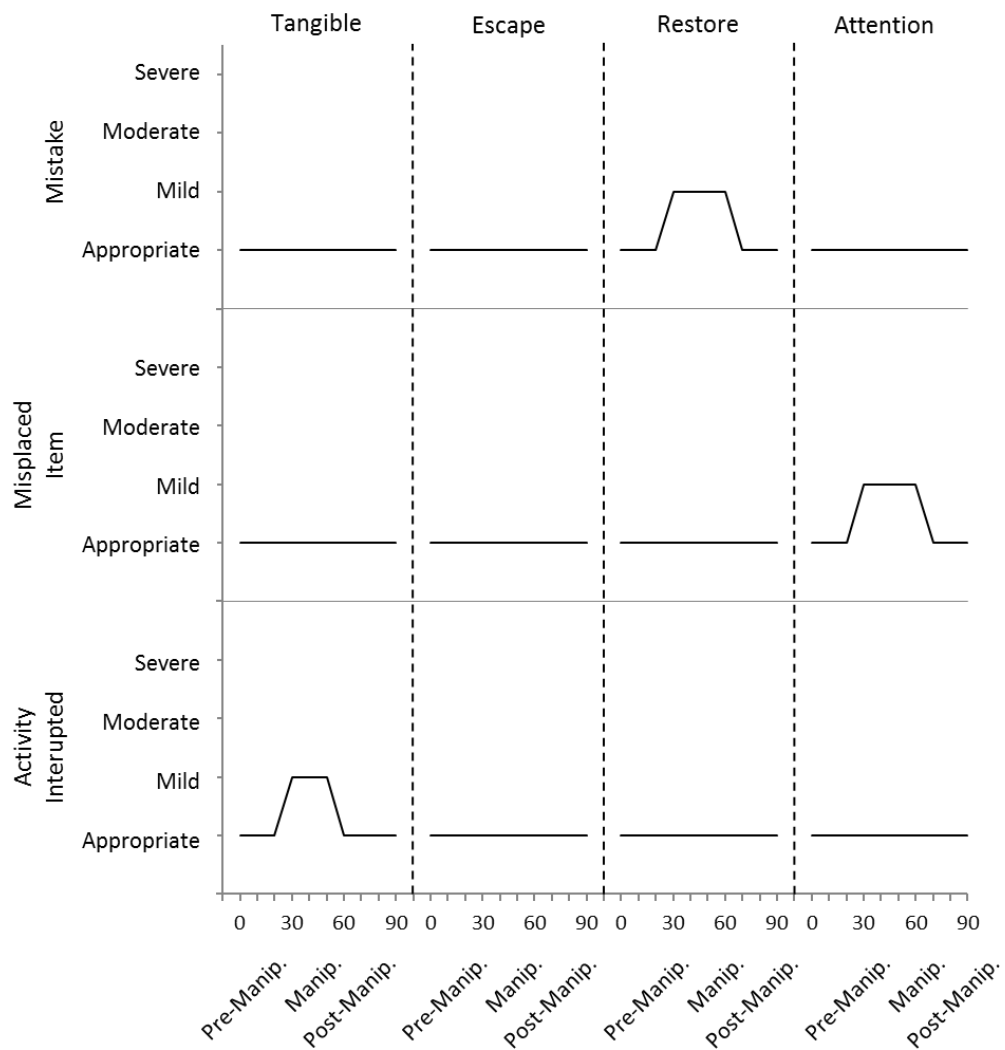
### **Inter-observer Agreement**

An independent observer collected data on Alex's problem behaviours on 25% of scenarios that were created to provide reliability of Alex's responses to each situation. Operational guidelines (see Appendix F) and recording procedures (Appendix G) were discussed with the independent observer (the same PhD candidate who assisted with the preference assessment) prior to implementation of the play-based procedure. Problem behaviour was recorded according to the uppermost level of severity observed within each 30-s interval (pre-manipulation, manipulation, post-manipulation). Inter-observer agreement was assessed on an interval-by-interval basis and was calculated using the formula:  $\text{Agreement}/(\text{Agreements} + \text{Disagreements}) \times 100\%$ . The resulting percentages of agreement were always 100%.

## **Results**

Alex did not show problem behaviour during baseline. Recall that during these first 30-s intervals, the three scenarios were not created at any time and the procedures associated with the attention, tangible, escape, and restore conditions were not being implemented.

As shown in Figure 5.1, mild problem behaviour was recorded during the 30-s period of the Mistake scenario, but only under the restore the environment condition. Problem behaviour also occurred during the 30-s period of Item Misplaced scenario, but only under the attention condition. Finally, problem behaviour occurred during the 30-s period of the Activity Interrupted scenario, but only during the tangible condition.



*Figure 5.1.* The level of problem behaviour observed within each 30-s interval under the Tangible, Escape, Restore Environment, and Attention conditions and within the Mistake, Misplaced Item and Activity Interrupted scenarios.

## Discussion

Two main findings emerged from this functional analysis study. First, problem behaviour occurred in the Mistake, Misplaced Item, and Activity Interrupted scenarios compared to the baseline intervals, when no such scenarios

were created. Appropriate behaviour was evident throughout the baseline portion (first 30 s) of the play routine, whereas problem behaviour was observed in all three of the scenarios that were intended to evoke insistence on sameness and resistance to change, but only under some of the functional analysis conditions. This finding suggests the three scenarios were effective in evoking problem behaviours related to insistence on sameness and resistance to change. This finding also suggests that the *BFRS-R* (Green, et al., 2006) was effective in identifying replicable scenarios related to insistence on sameness and resistance to change that reliably set the occasion for problem behaviour. The *BFRS-R* might thus represent a valid way to identify specific scenarios for assessing antecedent conditions that set the occasion for problem behaviours related to insistence on sameness and resistance to change.

The second main finding was that problem behaviour related to insistence on sameness and resistance to change appeared to serve one of three operant functions depending on the scenario. Specifically, when mistakes were created, problem behaviour appeared to have a function related to restoring the environment to its correct (mistake-free) state. When items were missing, in contrast, problem behaviour occurred under the attention condition, suggesting an attempt by the child to recruit help in finding the missing item. When the activity was interrupted, problem behaviour occurred under the tangible condition, suggesting an attempt to regain access to the materials and activity. Overall, these interactions (scenario  $\times$  condition) suggest that problem behaviours related to insistence on sameness and resistance to change might be maintained by specific types of environmental consequences, with the specific maintaining consequence dependent on the type of situation or scenario in effect.

The finding that problem behaviours were evoked by specific antecedent conditions related to interrupted activities, missing items, and mistakes is consistent with evidence from other researchers suggesting that, among children with ASD, such behaviours are often a reaction to environmental frustrations (Hartley et al., 2008; Sigafos, Arthur, & O'Reilly, 2003). In addition, the finding that problem behaviours appeared to be maintained by three different types of environmental consequences is consistent with evidence suggesting that problem behaviours among individuals with developmental disabilities are often maintained by attention, tangibles, and/or sensory (automatic) consequences (Iwata, et al., 1982/1994; O'Reilly, et al., 2010). Interestingly, problem behaviour was not observed under the escape condition in the present study, but this relation has been reported in numerous other studies (see Sigafos, et al., 2003 for a review). This could reflect the fact that the play activity used in the present study was sufficiently reinforcing to Alex and so he did not attempt to escape from it, even when a potentially problematic scenario arose.

The results should be interpreted with caution, however, as the study involved only one participant, and evaluated the effects of only three scenarios over a relatively few number of sessions. Still, this appears to be the first study investigating the motivational consequences that maintain problem behaviours related to insistence on sameness and resistance to change. If the results of the present study can be replicated with additional children with ASD, this would suggest that insistence on sameness and resistance to change that is so often observed in children with ASD might represent learned behaviours related to specific and interacting environmental antecedents and consequences. Any such replications

would benefit by incorporating both larger numbers of participants and additional scenarios and sessions.

Despite these limitations, the findings would seem to have implications for treatment. Specifically, the results suggest that there may be value in developing scenario-specific treatments. For Alex, for example, one might use functional communication training (Sigafoos et al., 2009) to teach him to request help in finding missing items in situations where items are misplaced. Functional communication training might also be used when activities are interrupted. In this scenario, the child could be taught to request continuation of the activity. In contrast, when a mistake has been made, it would seem more logical to teach the child to request help to correct the mistake or to teach problem solving strategies that would enable the child to identify and correct mistakes independently (O'Reilly, Lancioni, Sigafoos, O'Donoghue, et al., 2004).

## **Chapter 6**

### **Study 3. Comparison of Indirect and Direct Functional Assessments of Insistence on Sameness**

#### **Overview**

The play-based assessment described in the previous chapter demonstrated a novel paradigm to the functional assessment of problem behaviour associated with insistence on sameness and resistance to change. As with all new procedures, it would seem important to provide evidence to validate the approach. One way of doing this is to compare functional assessment outcomes from direct and indirect methodologies. There has up until now been no systematic attempt to examine the consistency of results between direct and indirect functional assessments with respect to problem behaviour associated with insistence on sameness and resistance to change. In an attempt to verify the value of conducting the play-based assessment described in the previous chapter, this chapter describes a comparison study.

#### **Introduction**

As described earlier in this thesis, functional assessment can be indirect and/or direct. A direct functional assessment is arranged systematically to control for the introduction and removal of stimulus in order to examine their effects on the frequency of observed behaviour (Iwata & Worsdell, 2005). In contrast, an indirect functional assessment may take the form of a behavioural interview or a questionnaire (Duker & Sigafos, 1998). One example of an indirect functional

assessment, the *Motivation Assessment Scale* (MAS, Durand & Crimmins, 1992), encompasses situations in which specific problem behaviours may occur; access to attention, sensory perception, a desire to escape a situation, and access to tangibles. Question scores are calculated to identify a most likely motivation for the behaviour.

Most commonly, an indirect assessment, such as the *MAS* (Durand & Crimmins, 1992), will be used to identify the function of a specific behaviour that can be further investigated in a direct functional assessment. Usually the condition that scores the highest on an indirect assessment is assumed as the function of the target behaviour. When another condition scores closely (for example between 0.25 and 0.5) to the highest scoring condition, it is also recommended for further analysis. For example, if the highest scoring condition in the *MAS* is ‘attention’, followed closely by the ‘tangible’ condition, then a direct functional assessment will be carried out using these two conditions.

Indirect and direct approaches for assessing the function of problem behaviours associated with insistence on sameness and resistance to change each have their pros and cons. For example, the *MAS* is useful in that it is fast and efficient (Durand & Crimmins, 1992; Iwata & Worsdell, 2005). The *MAS* takes approximately five minutes to complete, and requires the responsiveness of the caregiver only. Another important advantage of the indirect method is that it does not include the provocation of behaviour (Durand & Crimmins, 1992; Iwata & Worsdell, 2005). On the other hand, the direct functional analysis method described in *Chapter 5* required from five hours to complete (i.e., 10, 30-min sessions), and also required the commitment of the family, the child, and the assessor over a number of sessions. The complexity for the assessor in a direct assessment also extends to maintaining



consistency in implementing conditions (Iwata & Worsdell, 2005), provoking problem behaviour, and maintaining ecological validity under artificial circumstances (Hall, 2005). Nevertheless, the direct functional analysis allows for the record of observable behaviours, in contrast to reported behaviours (Herzinger & Campbell, 2007). As such the direct functional assessment may be helpful in providing a means for gathering supplementary information. However, a direct assessment has been suggested to be less appropriate for behaviours that occur at extremely low rates (Iwata & Worsdell, 2005). Still, the direct functional assessment may be beneficial in determining the influence of idiosyncratic stimuli on behaviour (Ringdahl, 2011).

In light of the advantages and disadvantages outlined, it would seem important to confirm the practicability of the play-based assessment approach. Therefore the first aim of this study was to validate the play-based functional assessment procedure for identifying the motivations of a lack of behavioural flexibility in children with ASD by considering the extent of agreement with a corresponding procedure. The functional assessment with the multi-element format described in *Chapter 5*, is a direct assessment (Iwata et al., 1982/1994), which combines a number of independent variables into one assessment (Hanley et al., 2003; Sidman, 1960; Ulman & Sulzer-Azaroff, 1975), and as such provides a good basis for comparison to the *MAS*.

Comparisons of this type are in short supply, and have had differing outcomes. For example, Crawford et al. (1992) compared the results of a direct approach, with A-B-C observations, and the *MAS* to investigate the function of stereotypic behaviour for four individuals with severe/profound intellectual

disabilities. Crawford et al. obtained consistent ratings of a sensory function for the stereotypic behaviour across *MAS* (Durand & Crimmins, 1992) and A-B-C observations. However, the functional assessment with the multi-element format (Iwata et al., 1982/1994) showed a different pattern of results for each individual. In another example, Hall (2005), demonstrated 75% agreement between the multi-element experimental format (Iwata et al., 1982/1994) and informant based procedures using the *Questions about Behavioral Function* questionnaire (QABF, Matson & Vollmer, 2000) to identify the function of self-injury, aggression, and disruption for four individuals with severe/profound developmental disabilities.

In another study, Toogood and Timlin (1996) obtained very low agreement (2.5%) between five functional assessment methods (informant-based interview, *MAS*, ABC chart, descriptive analysis, and multi-element experimental analysis across a wide range of behaviours including, aggression, property damage, negative vocalisations, self-injury, stereotypy, and other behaviours for 20 individuals with severe intellectual disabilities. It was observed that differences between methods was likely to vary not only whether direct or indirect, but also whether naturalistic versus controlled, modified versus intact, retrospective versus concurrent. It would seem that more work is needed to clarify the varied results across studies. Therefore, the second aim of this study was to build on these findings.

As described earlier in the thesis, though functional analysis procedures are seldom carried out in typically developing populations, their potential for identifying the function of problem behaviours that may form the basis for function based treatment in this population should not be overlooked (Broussard & Northup, 1995; Dufrene et al., 2007). Considering the promise for functional assessments in

typically developing populations alongside the risk for typically developing individuals to react to the frustrations in their environment in a similar manner to children with ASD during the early years (Evans et al., 1997), it would seem appropriate to assess equivalent contexts for insistence on sameness and resistance to change in a child who is typically developing. In the current study a comparison was made between the results of an indirect functional assessment, the *Motivation Assessment Scale* (MAS, Durand & Crimmins, 1992) and the results of the direct play-based functional assessment across three scenarios that were reported to invoke problem behaviour for two boys, one with ASD, and one typically developing.

## **Method**

### **Ethical Approval and Informed Consent**

Ethical approval was obtained by the Human Research /ethics Committee (Tasmania) Network (Appendix B). Informed consent was obtained from the children's parents for participation in this phase of the study.

### **Participants**

Two male participants, Peter (6 years old), and Nathan (4 years old) were recruited from the first study on the basis of accessibility and moderate to severe scores on the *Behavioural Flexibility Rating Scale-Revised* (BFRS-R, Green et al., 2007).

### **Peter.**

Peter was a six-year-old boy with autism. Peter's IQ had not formally been measured, though Peter's father reported demonstrated strengths and weaknesses in different areas of intellectual function. Peter's vocabulary was reported to be limited. Peter's *Vineland Adaptive Behaviour Scales-2<sup>nd</sup> Edition* (Vineland-II, Sparrow et al., 2005) age equivalencies (years: months) in the Communication domain were 1:3, 2:0 and 4:6 for receptive, expressive, and written language skills, respectively. For the Socialization domain, Peter received age equivalencies of 0:7, 0:9, and 1:9 for interpersonal relationships, play and leisure, and coping skills, respectively. On the *Aberrant Behavior Checklist-Community* (ABC-C, Aman & Singh, 1994) Peter received a total score of 98, indicating high levels of problem behaviour. His problem behaviours included irritability, foot stomping, crying, anxiousness, restlessness, and shouting.

### **Nathan.**

Nathan was a typically developing 4-year-old boy. Nathan's language skills were reported to be good, and his IQ was reported to be  $\geq 115$ . Nathan received the following age equivalencies (years: months) on the *Vineland-II* (Sparrow et al., 2005); 2:11, 4:4, and 4:2 for the receptive, expressive and written subdomains of Communication respectively, and 5:5, 4:0, and 4:6 respectively in the Socialisation domain. On the *ABC* (Aman & Singh, 1994) Nathan received a total score of 7, indicating low levels of problem behaviour. His problem behaviours included irritability, crying, complaining, and throwing items. Table 6.1 shows *ABC* subscale scores for the two boys.

Table 6.1

*Raw Scores for the Five Subscales of the Aberrant Behavior Checklist (ABC)*

	ABC Subscale	Irritability	Lethargy	stereotypy	Hyperactivity	Inappropriate Speech
Peter		21	21	15	34	7
Nathan		5	1	0	0	1

**Procedure**

The *Motivation Assessment Scale* (MAS, Durand & Crimmins, 1992) was completed by each of the children's mothers as part of *Study 1* with reference to insistence on sameness and resistance to change. Recall that in *Study 1*, parents were instructed to complete each item of the *MAS* in response to everyday situations of an insistence on sameness or resistance to change (see *Chapter 3: Methodology*). For example, item 1: Would this behaviour (an insistence on sameness or resistance to change) occur continuously if your child was left alone for long periods of time (for example one hour), item 8: Does this behaviour (an insistence on sameness or resistance to change) occur when you take away a favourite object, activity or food? Responses to the 16 items on the *MAS* were recorded on a Likert scale from 0 (Never) to 6 (Always).

**Scoring the Motivation Assessment Scale.**

The *MAS* (Durand & Crimmins, 1992) is scored by transferring the numeric score from the 16 items to a score sheet that is organised according to the four

motivations: sensory, attention, tangible and escape. Columns (corresponding to a motivation) are totalled to produce a raw score for each motivation. An average score can then be produced for each motivation. To identify the most likely motivation for problem behaviour to occur, the mean scores are ranked from highest to lowest. This ranking is used to identify the most important motivating influence on the behaviour. When interpreting scores on the *MAS* for intervention purposes, a score that receives a clearly higher margin than the rest is assumed to be the most important influence on the behaviour, and is thus given the rank (1). If two or three scores receive similar mean scores (i.e. within .25 to .50 points), then each are considered as influences for treatment purposes.

### **Play-based assessment.**

The play-based assessment was carried out in the same manner as in *Study 2*. Within the play-based assessment the function of Peter and Nathan's problem behaviour associated with insistence on sameness and resistance to change were observed using three scenarios that were reported to invoke problem behaviour. For both Peter and Nathan these were, (a) a momentary separation (b) a needed object is misplaced, and (c) the activity was interrupted.

### **Setting, context, and sessions.**

As in *Study 2*, the procedures were carried out in the living room and backyard of the children's homes. Each child was exposed to three scenarios during a naturalistic 30-min play routine following a baseline phase when no such manipulations were created. During each 30-min session, two of the three scenarios were created once

each (2 manipulations per session in total). Ten, 30-min sessions (inclusive of four sessions at baseline) were completed over a 5-week period for each child.

### ***Play.***

Children selected toys/games from the researcher's supply, or from their own supply at home. The researchers supply was individually prepared for each child with five age appropriate games/toys. Children were also permitted to engage in natural 'free play' situations. Children were also permitted to choose up to four play activities within each session.

### ***Play materials.***

Toys included block assembly games, a piano, a sketch pad, a butterfly catching game, shark fishing toy and play dough. 'Free play' included outdoor play and floor play. 'Free play' items included a large box, blankets pegs, a broom handle, sticky tape, and bubble blowing.

### ***Scenarios.***

As described in *Study 2*, children's scores on the *Behavioural Flexibility Rating Scale-Revised* (BFRS-R, Green et al., 2007) were used to identify scenarios associated with insistence on sameness and resistance to change. The function of Peter and Nathan's problem behaviour associated with insistence on sameness and resistance to change was observed during the following three scenarios for both Peter and Nathan: (a) a momentary separation (b) a needed object is misplaced, and (c) the activity was interrupted. Play was carried out in two parts, as in Green et al.'s (2008) study. In Part 1 (Baseline), the child played naturally without the disturbance of any

of the scenarios created to evoke an insistence on sameness or resistance to change. In Part 2, the three scenarios for evoking insistence on sameness or resistance to change were created under attention, tangible, escape, and restore conditions.

### **Response definition and measurement.**

As in *Study 2*, the children's level of problem behaviour was classified into four levels of severity: (0) appropriate responding, i.e. no problem behaviour observed, (1) mild problem behaviour, defined as complaining, whingeing, or verbally protesting, (2) moderate problem behaviour, defined as foot stomping yelling/shouting, and/or throwing items, and (3) severe problem behaviour, i.e. the children engaged in tantrums involving aggression or self-injury. The severity of behaviour was recorded during 30-s intervals that occurred prior to, during and after exposing the children to each of the three scenarios (see Procedures) and under the four functional analysis conditions (i.e., attention, restore, escape, and tangible conditions) that were embedded within each scenario. The severity of any instances of problem behaviour was recorded for the duration of the four 30-min baseline sessions.

### **Functional analysis.**

Four conditions were arranged in a multi-element design (as described in *Study 2*) based on the procedures described by Iwata et al. (Iwata et al., 1982/1994). Four possible motivating factors (i.e., attention, escape, restore, and tangible) served as conditions. During the attention condition, the child was provided with verbal (e.g. 'everything is ok') and/or physical contact (e.g. a pat on the back) contingent upon any occurrence of problem behaviour (mild-severe). In the escape condition,



the child was permitted to leave the play situation or move on to another game contingent upon any occurrence of problem behaviour. In the restore condition the situation was returned to its previous state. For example, if an item was missing, the item was restored contingent upon an occurrence of problem behaviour. For the tangible condition, a preferred object, which was made visible to the child, was provided contingent upon an occurrence of problem behaviour.

A direct preference assessment was carried out over two sessions prior to the play-based assessment for each child to identify preferred objects for the tangible condition. Toys, food, and sensory items were selected from a list of items reported by the children's parents as favoured by each individual. Nine items in total were offered successively at each session for 30-s each. In each session children were presented with 27 items (for a total of 54 presentations). Preference for the item was recorded if the child picked up the item and responded to it for at least 5-s. The order and combination of scenarios and functional analysis conditions were counterbalanced and randomly allocated using a random number generator.

#### **Inter-observer agreement.**

A second observer was trained to record instances of problem behaviour. The independent observer recorded children's responses from video-tapes on 25% of scenarios. These scenarios for observation were chosen randomly. Inter-observer agreement was measured as in *Study 2*. The resulting percentages of agreement were 100%. Inter-observer agreement obtained during the preference assessment for 50% of presentations was also recorded at 100%.

## Results

Table 6.2 shows the mean scores and ranking for Peter and Nathan for the four MAS conditions.

Table 6.2

*Mean MAS scores and relative ranking for the four MAS conditions: Tangible, Sensory, Escape, and Attention for Peter and Nathan*

	Escape	Tangible	Sensory	Attention
Mean Score				
Peter	1	0.75	5.5	1.5
Nathan	2.75	4.5	0.75	1
Relative Ranking				
Peter	3	4	1	2
Nathan	2	1	4	3

### Peter

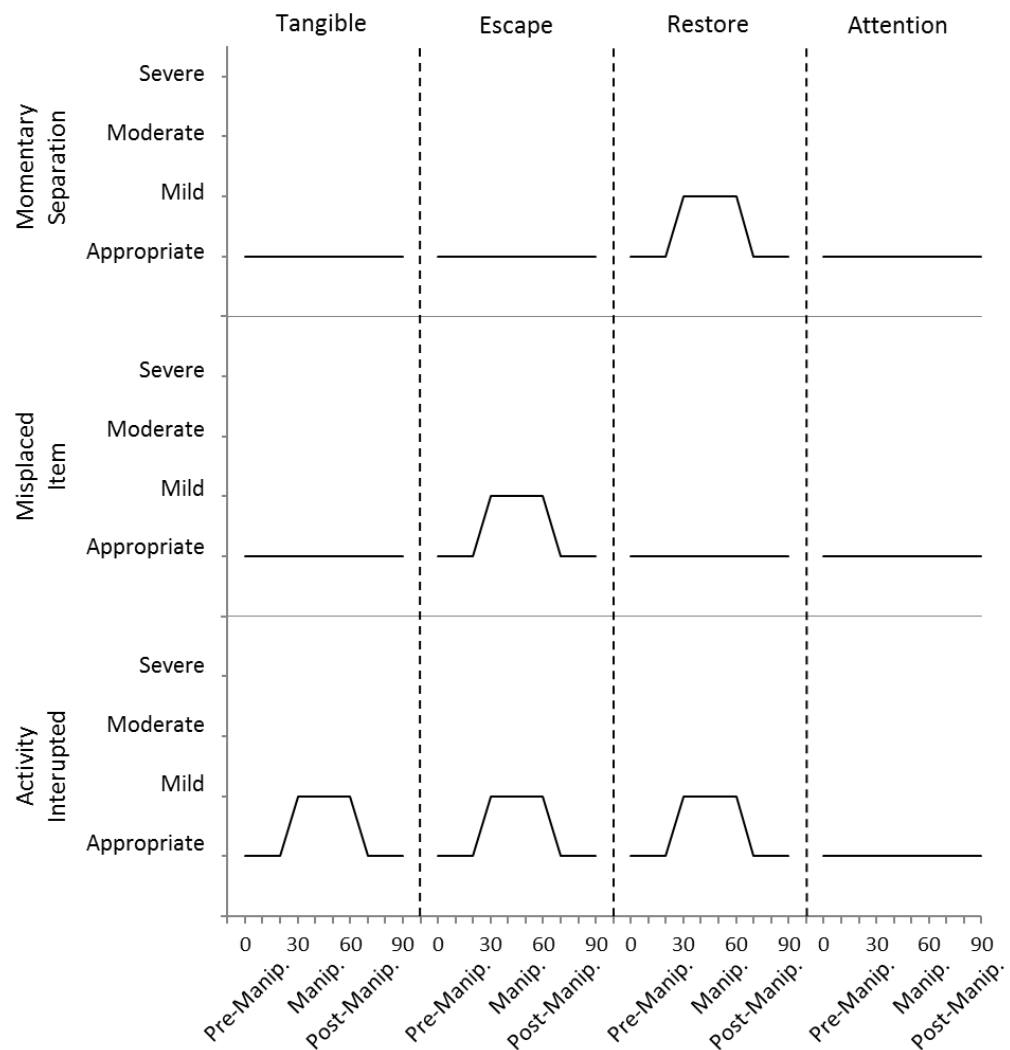
#### Motivation Assessment Scale.

Peter's MAS mean scores and ranking (Mean Score: Rank) were: Sensory (5.5: 1), Attention (1.5:2), Escape/Avoidance (1:3), and Tangible (0.75:4). The results of the MAS indicate that an insistence on sameness and resistance to change may be predominantly a sensory seeking behaviour for Peter.

#### Play-based assessment.

Peter did not show problem behaviour during baseline. As shown in figure 6.1, mild problem behaviour was recorded during the 30-sec period of the item misplaced scenario, but only under the Escape condition. Problem behaviour also

occurred during the 30-sec period of the momentary separation scenario, but only during the restore condition. Finally, mild problem behaviour was observed during the 30-s period of the activity interrupted scenario for three conditions; escape, tangible and restore. Peter tolerated (7/12) manipulated scenarios, and demonstrated (0%) problem solving skills.



*Figure 6.1.* The level of problem behaviour observed within each 30-s interval for Peter under the Tangible, Escape, Restore Environment, and Attention conditions and within the Momentary Separation, Misplaced Item and Activity Interrupted scenarios.

## Nathan

### Motivation Assessment Scale.

Nathan scored the following (Mean Score: Rank) on the MAS: Tangible (4.5: 1), Escape/Avoidance (2.75: 2), Attention (1: 3), and Sensory (0.75: 4), indicating

that gaining access to tangibles may be the primary function of an insistence on sameness and resistance to change for Nathan.

### **Play-based assessment.**

Nathan revealed problem behaviour in one instance during baseline. As shown in Figure 6.2, mild problem behaviour was recorded during the 30-s period of the Misplaced Item scenario, but only under the attention condition. Problem behaviour also occurred during the 30-s period of the Activity Interrupted scenario, but only under the Attention condition. No problem behaviour was observed during the ‘separation’ scenario. Nathan demonstrated problem solving on (2/12) occasions, and tolerance to (8/12) manipulated scenarios.

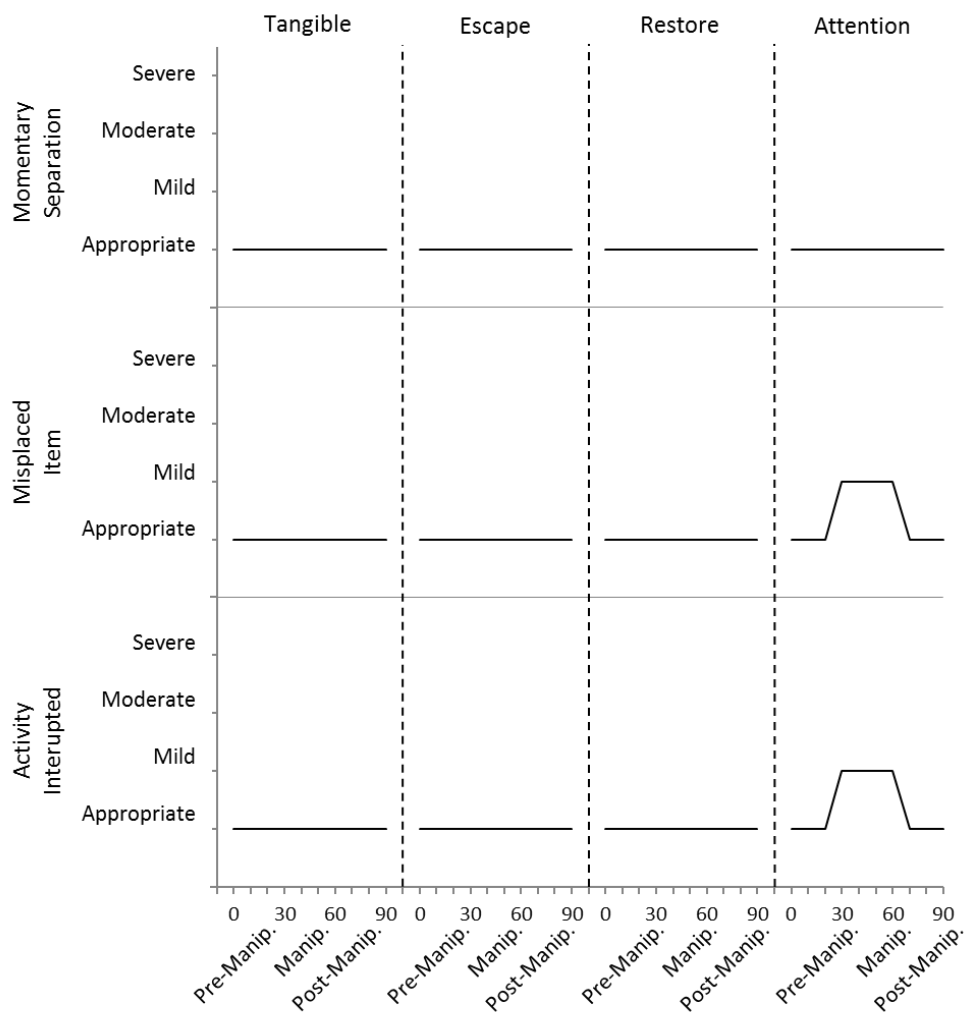


Figure 6.2. The level of problem behaviour observed within each 30-s interval for Nathan under the Tangible, Escape, Restore Environment, and Attention conditions and within the Momentary Separation, Misplaced Item and Activity Interrupted scenarios.

## Discussion

The purpose of the present study was to verify the play-based assessment procedure by comparison of findings related to insistence on sameness and resistance to change with the results of the *Motivation Assessment Scale* (Durand & Crimmins,

1992), an equivalent procedure. The main findings of this study are that the play-based approach appears to be a successful model for the assessment of the function of problem behaviour associated with insistence on sameness and resistance to change. The play-based assessment, as in *Study 2*, was able to enhance ecological validity with procedures involving naturalistic play scenarios utilising the child's own toys, and 'free play' in the child's natural environment. The results of the play-based assessment were also mainly in line with results of the *MAS*. These findings are consistent with earlier findings indicating that the multi-element format described by Iwata et al. (1982/1994) is congruent to informant based procedures (Hall, 2005). The findings however, are in contrast to previous studies utilising the *MAS* as a comparison to the multi-element approach, which have demonstrated low rates of agreement (Crawford et al., 1992; Toogood & Timlin, 1996).

The findings indicated that in the main, Peter's play-based assessment results were consistent with the results of the *MAS*. Peter's first ranked function related to an insistence on sameness and resistance to change according to the *MAS* was 'sensory feedback'. Thus the *MAS* indicated that sensory seeking behaviour was overall the most important influence on sameness behaviour for Peter. In the course of the play-based assessment it was observed that the 'family separation' scenario appeared to have a restore function on one occasion for Peter, which was seemingly to restore the setting to a familiar context. A restore motivation was also observed on one occasion during the activity interrupted scenario, indicating a possible desire to restore the setting to its previous state. Additionally, the identification of an escape motivation when items were missing may have suggested an attempt to gain access to an alternative activity in an effort to avoid the unpleasant sensory/perceptual

situation of things not being ‘just right’ in the environment. In taking into consideration Lovaas et al.’s (1987) perceptual theory, Peter’s apparent desire for a return of the environment to its previous state may reflect a subjectively preferred perceptual consequence. This assumption is consistent with descriptions of sensory sensitivities and unusual sensory response in individuals with ASD (Gabriels et al., 2008; Smith-Myles et al., 2004), and also with O’Reilly et al.’s (2010) findings where problem behaviour was observed to be maintained by automatic reinforcement by 8 out of the 10 participants with ASD in their study.

Alongside escape, and restore motivations in relation to the scenario in which an activity was interrupted, a tangible function was also observed on one occasion. For example, during Peter’s unstructured ‘blanket play’, problem behaviour appeared to be motivated by the desire to gain access to an alternative activity on one occasion, and to reinstate the activity on another occasion. On the other hand, when the activity was interrupted on the occasion of free-play ‘fishing’, Peter’s problem behaviour appeared to be an attempt to regain access to the materials and activity. Findings indicating more than one environmental variable maintaining behaviour were also demonstrated in *Study 2*, and have been reported in other studies of functional analysis (E. G. Carr & Durand, 1985; Day et al., 1994; Hausman, Kahng, Farrell, & Mongeon, 2009).

These results also reflect to some degree the results of the *MAS* where the ‘escape’, ‘tangible’, and ‘attention’ mean scores were within .5 points, which according to Durand and Crimmins’ (1992) *MAS* guidelines, suggest the possibility of differential functions related to context. These findings suggest that Peter’s insistence on sameness and resistance to change may not only be motivated by



different functions depending on the situation, but may also change over time. These results are in line with previous suggestions that the function of particular behaviours may not remain the same over time (Bodfish, 2004; Joosten & Bundy, 2008).

Peter's second ranked function on the *MAS* was 'attention' and third 'escape/avoidance'. According to the results of the *MAS*, a desire for attention followed by a desire to escape, as well as gaining access to tangibles may be additional, though less important motivators of sameness behaviour for Peter. While on the *MAS* an attention motivation was ranked second for Peter, an attention motivation was not evident for any of the manipulated scenarios in the play-based assessment. The current study limited scenarios for observation in the play-based assessment to three per child. It might be possible that if additional scenarios reported to be a problem for Peter, had been added to the play-based assessment, for example Peter is required to try something new, or a planned event is delayed or cancelled, that Peter might indeed show an attention motivation.

Despite some similarities, stronger irregularities between the results of the play-based assessment and the results of the *MAS* for were evident for Nathan. Nathan's first ranked and thus most important function according to the *MAS* was a desire for access to tangible items, followed by the additional motivations escape, attention and sensory seeking behaviours. In the play-based assessment, Nathan evidenced problem behaviour on only three occasions; once during baseline, in the 'activity interrupted' scenario, and in the 'item missing' scenario. The same operant function appeared to be evident for each of these manipulated scenarios (attention). Nathans attention function in the 'item missing', scenario perhaps suggested an

attempt to gain help to find the missing item and in the ‘activity interrupted’ scenario was perhaps an attempt to regain access to the activity.

According to *MAS* score interpretation guidelines, in Nathan’s case, the attention function should be interpreted as a less significant functional indicator (Durand & Crimmins, 1992). While Nathan’s first ranked function of an insistence on sameness and resistance to change was access to tangibles, and his second ranked function was escape, neither of these were observed to serve a function for sameness behaviour in the play-based assessment. Considering the findings indicating a lower concern for insistence on sameness in typically developing children in *Study 1*, insistence on sameness and resistance to change may be low-rate behaviour for Nathan. As such it may be less likely to be observed during the play-based assessment, and may be more suited to the indirect informant approach (J. E. Carr & LeBlanc, 2003).

Nevertheless, Nathan’s attention motivation is consistent with previous studies using functional analysis procedures in classroom settings to assess problem behaviour in typically developing children. For example, peer and teacher attention (Broussard & Northup, 1995; Doggett et al., 2001; T. J. Lewis & Sugai, 1996b), alongside escape from educational demands (Broussard & Northup, 1995) have been identified as maintaining contingencies for typically developing primary school-aged children. This is the first study, however to identify social attention as a function of problem behaviour associated with a lack of behavioural flexibility in a typically developing child.

When placed together, the results for Nathan and Peter suggest that motivations for problem behaviour associated with insistence on sameness and resistance to change may be different for children with ASD compared to those who are typically developing. Though, with a comparison of two participants, this finding should be interpreted with caution. Nevertheless, in *Study 1*, the findings indicated greater sensory/perceptual motivations related to a lack of behavioural flexibility in the children with ASD as compared to the typically developing children. Moreover, findings demonstrating a tendency towards sensory functions explaining the problem behaviour in individuals with ASD have been demonstrated in previous studies (Joosten & Bundy, 2008; O'Reilly et al., 2010). These findings are also consistent with previous assumptions that the function of problem behaviour may differ between individuals, and across different contexts (Hanley et al., 2003).

The results build upon the results of *Study 2* to further demonstrate the usefulness of the *Behavioural Flexibility Rating Scale* (BFRS-R, Green, et al., 2007) in identifying scenarios that are able to reproduce the conditions that set the occasion for problem behaviour associated with an insistence on sameness and resistance to change. In addition, the results extend the findings of *Study 2* to demonstrate that the play-based assessment is a valuable approach to the assessment of the functional properties of insistence on sameness and resistance to change in ASD.

In comparison to the *Motivation Assessment Scale* which is able to differentiate between motivations according to the setting in which they occur, for example, home or school (Durand & Crimmins, 1992), the play-based assessment, demonstrated the supplementary capability to differentiate the motivations of an insistence on sameness and resistance to change according to specific scenarios in

which they occurred. Therefore, in contrast to the *MAS*, the play-based assessment was able to provide comparatively clear-cut situations relative to apparent motivations for an insistence on sameness and resistance to change that may be used in subsequent treatment. The play-based assessment was also able to determine situations and conditions under which the behaviour does not occur, which can be useful when determining a starting point for treatment (Ringdahl, 2011).

The direct play-based assessment approach appears to be particularly beneficial for use with children with ASD, whose sameness behaviours appear to be of a higher rate than typically developing children (see *Study 1*). Correspondingly, an indirect approach may be more suitable to identifying the function of this behaviour in typically developing children. However, more work will be required to verify these findings.

It is important to note the limitations to this study. Firstly, the play-based assessment was carried out on only two individuals, one with LFA, and one who was typically developing. In addition to this, problem behaviour was observed on one occasion during baseline for Nathan, which raises questions surrounding findings within manipulated scenarios. It also appears that while the severity of the problem for the child may pose a serious problem for families as indicated by responses on the *BFRS-R* (Green, et al., 2007), these instances of sameness behaviour may occur at a low base rate (Ozonoff et al., 2005). As such particular behaviours may not have become apparent during the play-based assessment. Future work should therefore include repeated observations to minimise this problem (O'Reilly et al., 2010). Also, as particular sameness behaviours may occur in the home setting and others at school (Lang, Sigafoos, Lancioni, Didden, & Rispoli, 2010), it may be advantageous to

carry out the assessment in both settings. Research is also necessary to determine if the functional assessment outcomes lead to effective intervention in both children with ASD and typically developing children.

While the conditions measured by the *MAS* (Durand & Crimmins, 1992) correspond to the play-based assessment conditions, the use of the more general ‘insistence on sameness and resistance to change’ as the description of the behaviour may have affected parent response on the scale, and as such the results (Durand & Crimmins, 1992). For this reason, the authors of this scale recommend that a specific behaviour is selected. Thus a more analogous finding may have been achieved if the *MAS* had been completed separately for each of the three *BFRS-R* scenarios.

Nevertheless, these findings extend previous research in functional analysis procedures in two important ways. Firstly through the systematic appraisal of direct and indirect functional assessment procedures to identify insistence on sameness and resistance to change, and secondly by employing functional analysis procedures, to examine insistence on sameness and resistance to change in a child who is typically developing.

## **Chapter 7**

### **Conclusions**

The current thesis set out to further our understanding of an insistence on sameness and resistance to change in children with ASD. The main focus was to determine the functional characteristics of this behaviour in children with ASD. This was achieved via indirect (questionnaire) and direct (play-based functional assessment) procedures in *Studies 1, 2 and 3*. A further objective was to examine some of the characteristics that may be involved in children's apparent need for sameness. A number of hypotheses were developed for this thesis based on previous literature. These hypotheses were examined across the three studies, and will be considered in the following section.

This appears to be the first study of the motivational properties of an insistence on sameness and resistance to change in both children with ASD and typically developing children. It also appears to be the first investigation to perform a functional analysis procedure operating around a play-based assessment. This chapter aims to bring together the findings of the studies outlined in the thesis and discuss them in light of the aims and limitations of the thesis, and current initiatives in ASD research.

#### **Main Findings Arising from the Thesis**

There were a number of important findings resulting from the work in this thesis. This section will outline the main findings in relation to the research hypotheses conveyed in the introduction (*Chapter 1*).

Hypothesis # 1. Children with ASD will show more inflexible behaviour than typically developing children.

The results in *Study 1* supported the hypothesis that insistence on sameness and resistance to change may be more prevalent in children with ASD. The study also demonstrated that there may be specific scenarios associated with sameness behaviours that may differentiate these children from typically developing children as well as those with other developmental disorders.

Hypothesis # 2. Children with HFA will display greater levels of inflexible behaviour than both LFA and typically developing children.

Though the hypothesis that children with high versus low functioning autism would display differing levels of sameness behaviour was not supported by the findings in this thesis, *Study 1* revealed that there may be discrete patterns in terms of severity of the problem and frequency of the behaviour in high and low functioning children with ASD. That is, while severity of the problem may be relatively equivalent, there may be differences in the frequency in which the behaviour occurs.

Hypothesis # 3. The relationship between group status (high/low functioning ASD, typical development) and behavioural flexibility will be mediated by adaptive function, sensory sensitivity, and/or affective response.

As hypothesised, it was found that there may be some intermediary factors that influence the problem behaviours associated with insistence on sameness and resistance to change, such as emotion regulation and atypical sensory processing. Despite indications that adaptive behaviour may play a role in insistence on sameness and resistance to change, the findings of *Study 1* did not support this view.

Hypothesis # 4. The function of problem behaviour associated with an insistence on sameness and resistance to change will be different for HFA, LFA and typically developing children.

The hypothesis that the function of problem behaviour associated with a lack of behavioural flexibility would be different across the three groups was partly supported by the findings in this thesis. For example, *Study 1* demonstrated that problem behaviour associated with insistence on sameness and resistance to change may be maintained mainly by sensory consequences for children with ASD. Moreover, in *Studies 2* and *3*, it was found that the function of problem behaviour associated with insistence on sameness and resistance to change may be characteristically related to specific scenarios.

Hypothesis # 5. The play-based functional assessment will prove to be a valid measure of the function of an insistence on sameness and resistance to change.

As hypothesised, these studies were also able to validate the functional play-based assessment procedure for identifying the motivational properties of inflexible behaviour in children with ASD. The play-based assessment was able to take into account particular situational complexities which an indirect assessment is unable to achieve, for example the scenario  $\times$  condition interaction. The play-based assessment was also better able to take into account aspects of ecological validity related to subjective experiences, for example, utilising the child's own toys and spontaneous play.



## **Implication of the Findings**

The finding that insistence on sameness and resistance to change may be more prevalent in children with ASD has important implications for the treatment of this behaviour. For example, children may be targeted early on for intervention aimed at producing greater levels of flexibility. If intervention occurs early on in development, it may decrease opportunities for the behaviour to become ingrained. This may in turn decrease the prospect that the behaviour will be difficult to manage/treat.

The finding regarding the possibility of intermediary factors that influence the problem behaviours associated with insistence on sameness and resistance to change indicates a need for researchers and clinicians to consider these and other associated symptoms in their work. These findings also put forward a compelling argument for the need to consider certain associated symptoms within ASD diagnosis.

There are important implications in terms of assessment also. For example, the finding that there may be idiosyncrasies in the behaviour for these children that may help to distinguish them from typically developing children as well as children with other developmental disorders may lead to advancements in the assessment of ASD traits in general, especially in relation to the differentiation of ASD subcategories. It appears that the *BFRS-R* may be a useful tool for identifying such idiosyncrasies.

The current thesis established the play-based assessment as a valuable approach to the assessment of the functional properties of an insistence on sameness

and resistance to change. The play-based assessment demonstrated the advantage of being able to identify specific situations in which a lack of behavioural flexibility might occur, and to link these situations with a particular function. Thus, there may be merit in utilising the assessment procedure to identify scenario-specific treatments, such that the observed scenario  $\times$  condition interaction is able to provide a context for the type of intervention required.

Such treatments can be aimed at replacing the maladaptive response (problem behaviour) with an adaptive response (communicating a desire, problem solving). For example, functional communication training may be the optimal approach for a situation involving missing items and an attention motivation. In this example, the child may be taught to request help to find the missing item. Functional communication training may also be an appropriate strategy for a situation involving an interrupted activity and an attention motivation. In this case it may be beneficial to teach the child to communicate a desire to reinstate the activity. Another example may be to teach the child to problem solve when an item is missing. They may be taught to go and look for the missing item, or to think about what they need to do to obtain assistance.

These types of intervention may benefit the child by improving their social connections (O'Reilly, Lancioni, Sigafoos, Green, et al., 2004; T. Smith, McAdam, & Napolitano, 2007). Another important aspect of these interventions is that the emphasis on a particular situation, may afterwards be generalised to similar situations that may occur in other environments, with other activities/materials, and other individuals (Alberto & Troutman, 2006), thus increasing tolerance overall.

## **Limitations**

Limitations for each of the studies outlined in this thesis have been presented alongside each of the studies. However, there are some further limitations that have been identified involving the thesis as a whole. For example, the strength of the findings in this thesis was limited by low participant numbers in each of the studies. This shortcoming may be explained by the particular constraints involved in ASD research.

It is possible, for instance, that the sensitive nature of the data being collected, as well as the particular circumstances of participating parents/caregivers, for example, a stressful home environment limited intention to participate. Parents of children with autism may face additional stressors over and above those already experienced by parents with developmental disabilities (Lecavalier et al., 2006). These may be related to the social, communication, and self-care difficulties, as well as the additional care that is needed for these children, and possibly a lack of understanding by the wider community. These aspects of the parent/carers day to day life have been reported to bring about depression and anxiety, decreased family cohesion and burnout (Schieve, Blumberg, Rice, Visser, & Boyle, 2007). It is also possible that parents have been overburdened by similar assessments in the past, and thus resistant to complete additional assessments. For these reasons, data collection was extended to areas outside of the relatively small population base of Tasmania to Victoria. Future work aiming to lessen the burden on parents may do this by also collecting information from teachers, and other caregivers.

Another important limitation was that the play-based assessments in *Studies 2 and 3* were carried out only in the home environment, thus limiting the generality of the findings to the home setting. In these studies, parents were provided with an option of home and school, and all three chose the home environment. It is possible that the high levels of stress that may already be apparent in the home setting (Schieve et al., 2007) may have influenced the results of *Studies 2 and 3*. It is therefore important for future research to carry out the play-based assessment for the same child across a number of settings (e.g. home, school).

A further shortcoming of the thesis was that each of the studies relied on parent report (either completely, as in *Study 1*, or to identify scenarios for assessment in *Studies 2 and 3*), which may be biased. Therefore, it may also be necessary to obtain information from teachers as well as parents, and/or other informants to, not only to reduce the burden on participants as mentioned earlier, but also to obtain a comprehensive representation of the behaviour prior to carrying out the play-based assessment.

Finally, the studies in this thesis made comparisons only between children with ASD and those who were typically developing, despite the occurrence of insistence on sameness and resistance to change in children with obsessive compulsive disorder and other developmental disabilities. In terms of the generalisability of the results, it would be advantageous for future work to include children with other developmental disorders, or those with obsessive compulsive disorder.

## **Future Research**

The findings of this research should encourage researchers and practitioners to carry out treatment using the play-based assessment. It would be particularly useful to investigate the potential for teaching problem solving and tolerance building (Green et al., 2008), as well as in using functional communication training to provide children with appropriate strategies to replace their problem behaviour (E. G. Carr & Durand, 1985; E. G. Carr et al., 1994). These types of assessments may benefit both low functioning individuals who may have a limited repertoire of language as well as high functioning individuals. For example, lower functioning individuals may be taught signs to convey particular frustrations, while higher functioning individuals may be taught to use a particular phrase, for example “I need help”.

These types of interventions may also work well in conjunction. For example, it may be possible that despite a level of cognitive function that would presume the ability to problem solve, the low rates of problem solving evidenced in children with Asperger syndrome (Attwood, 2006; Green et al., 2008) may be linked to deficits in emotion regulation. That is, it is possible that the immediate frustration that occurs in relation to change in these children may block opportunities for problem solving. As such it may be advantageous to examine potential methods for incorporating treatment strategies to teach both problem solving and self-management. There have been some promising studies evaluating self-management (Dooley et al., 2001; Koegel, Koegel, Hurley, & Frea, 1992; see Machalicek et al., 2007 for a review), as well as problem solving (O'Reilly, Lancioni, Sigafos, Green, et al., 2004) to teach social skills and decrease challenging behaviour in children

with ASD. However, this has not yet been investigated in relation to insistence on sameness and resistance to change.

A further important aspect for intervention research is to determine the most effective approaches for particular children. Therefore it is recommended that future work aims to investigate treatments incorporating the play-based assessment approach alongside alternative treatment strategies, for example, the accommodation approach. Currently there are few studies to support this latter approach (Dooley et al., 2001; Mesibov et al., 2002; Mesibov et al., 2004). There are also few studies that have compared the accommodation approach against approaches utilising principles derived from Applied Behaviour Analysis (Callahan, Shukla-Mehta, Magee, & Wie, 2010; Dalla-Piazza & Fadanni, 2002). As different approaches may suit different individuals (Francis, 2005), this would seem to be an imperative for future research.

A further potentially useful direction for future research would be an attempt to gain a further understanding of the underlying aspects of adaptive behaviour, sensory abnormalities and aberrant behaviour in children with ASD that may interact with instances of sameness behaviour. It may be important to utilise comprehensive assessment of each of these behaviours in order to tease out the particular characteristics involved. This may in turn help us to gain a better understanding of ASD.

Another important consideration for future research is to ensure the delivery of ecologically valid assessments and interventions (Hanley et al., 2003). This means arranging procedures to reflect as much as possible the natural circumstances in which the behaviour occurs. There are a number of ways in which this can be

achieved. The current study embedded choice and child preferences into the play-based assessment procedures, as well as carrying out the assessment in the natural environment (e.g. the home). There are some further ways that ecological validity can be achieved however, that have not yet been investigated in this type of assessment.

Previous research suggests that ecological validity may also be produced by including individuals with a previous history of interaction with the child (Hanley et al., 2003; Neisworth & Bagnato, 2004). Future work utilising the play-based assessment procedure outlined in this thesis may benefit from including this aspect of ecological validity. It would also be important to verify that the assessment may be able to be used by the people that engage with the child in the setting in which the behaviour occurs (Singer, 2000), for example the classroom.

The use of functional analysis procedures in educational settings has been emerging as ‘best practice’ for the identification of variables associated with problem behaviours in the classroom (Doggett et al., 2001). Indeed, Sigafoos and Sagers (1995), and Bloom, Iwata, Fritz, Roscoe, and Carreau (2011) have demonstrated success with functional analysis approaches that were interspersed or embedded into classroom activities. This practice has additional benefits. For example, Bloom et al. suggest that incorporating assessment in the classroom for a small amount of time each day poses minimal disruption to both the child being observed, as well as to other student’s in the classroom. It also eliminates the need for alternative arrangements to be organised for the rest of the class during the analysis. Researchers have also demonstrated the potential for functional assessment to be carried out by the teacher in the classroom, with minimal training (Machalicek

et al., 2007). Therefore the next logical step is to determine the play-based assessments practicality in the classroom setting.

On another note, there appeared to be particular aspects related to the attention function of problem behaviour that may warrant further consideration. For example, considering that an attention function may possibly be related to an inability to use appropriate strategies such as requesting help, it is possible then that this finding may be related to the lower proficiency for language observed in LFA individuals (American Psychiatric Association, 2000). Future work should therefore include an appropriate measure of language functioning. A challenge for future research may also be to determine whether the attention function in children with LFA and typically developing children originates from the same or different conditions.

## **Summary**

The current thesis has generated new findings that supplement previous work to validate the *BFRS-R* (Green, et al., 2007). The work in this thesis has also provided a direct examination of a novel approach to the functional assessment of insistence on sameness and resistance to change. It appears that this is the first investigation of the functional properties of a lack of behavioural flexibility in children with ASD, as well as in typical development.

It is anticipated that the work in this thesis will lead to a better understanding of inflexible behaviour in children with ASD, as well as to advance our understanding of the idiosyncrasies of the behaviour in children with HFA, LFA, and typical development. The play-based functional assessment is a procedure that can



be utilised as a starting point for interventions to teach children to be more tolerant, and thus more flexible.

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## **Appendices**

Appendix A: General Information Questionnaire

Appendix B: Ethics Application Approval

Appendix C: Information Sheet and Consent Forms

Appendix D: Behavioural Flexibility Rating Scale - Revised (BFRS-R)

Appendix E: Sameness Questionnaire

Appendix F: Operational Guidelines

Appendix G: Record Sheet (play-based functional assessment)

Appendix H: Reinforcer Checklist

## Appendix A

### General Information Questionnaire

#### GENERAL INFORMATION

NAME: \_\_\_\_\_

DATE OF BIRTH: \_\_\_\_\_ SEX: Male ☐ Female ☐

DIAGNOSIS: (if applicable) \_\_\_\_\_

AGE AT DIAGNOSIS: \_\_\_\_\_

Diagnosis provided by: G.P. ☐ Paediatrician ☐ Assessment Team ☐

LANGUAGE:

Does not use words ☐ Moderate use of language ☐

Limited Vocabulary ☐ Good use of language ☐

MEDICATION: \_\_\_\_\_

THERAPY: \_\_\_\_\_

BIRTH: Normal Yes ☐ No ☐

If no, please describe: \_\_\_\_\_

\_\_\_\_\_

FAMILY HISTORY: (if any) \_\_\_\_\_

\_\_\_\_\_

SIBLINGS: AGE ☐ SEX ☐ AGE ☐ SEX ☐

AGE ☐ SEX ☐ AGE ☐ SEX ☐

## Appendix B

### Ethics Application Approval

COPY

MEMORANDUM

<http://www.research.utas.edu.au/index.htm>

Private Bag 01 Hobart  
Tasmania 7001 Australia  
Telephone (03) 6226 2764  
Facsimile (03) 6226 7148  
Marilyn.Knott@utas.edu.au



HUMAN RESEARCH ETHICS COMMITTEE (TASMANIA) NETWORK

#### FULL COMMITTEE ETHICS APPLICATION APPROVAL

8 August 2008

Professor Carey Denholm  
Conservatorium of Music  
Private Bag 1306  
Hobart

**Ethics reference: H10137**

**Investigating the function of Sameness Behaviour in children with Autism.**

**PhD candidate: Nadia Ollington**

Dear Professor Denholm

The Tasmania Social Sciences HREC Ethics Committee approved the above project on 4 August 2008.

All committees operating under the Human Research Ethics Committee (Tasmania) Network are registered and required to comply with the *National Statement on the Ethical Conduct in Research Involving Humans 1999* (NHMRC guidelines).

Therefore, the Chief Investigator's responsibility is to ensure that:

- 1) All researchers listed on the application comply with HREC approved application.
- 2) Modifications to the application do not proceed until approval is obtained in writing from the HREC.
- 3) The confidentiality and anonymity of all research subjects is maintained at all times, except as required by law.
- 4) Clause 2.37 of the National Statement states:  
*An HREC shall, as a condition of approval of each protocol, require that researchers immediately report anything which might warrant review of ethical approval of the protocol, including:*
  - a) *Serious or unexpected adverse effects on participants;*
  - b) *Proposed changes in the application; and*
  - c) *Unforeseen events that might affect continued ethical acceptability of the project.*

The report must be lodged within 24 hours of the event to the Ethics Executive Officer who will report to the Chairs.

A PARTNERSHIP PROGRAM IN CONJUNCTION WITH THE DEPARTMENT OF HEALTH AND HUMAN SERVICES

- 5) All participants must be provided with the current Information Sheet and Consent form as approved by the Ethics Committee.
- 6) The Committee is notified if any investigators are added to, or cease involvement with, the project.
- 7) This study has approval for four years contingent upon annual review. An *Annual Report* is to be provided on the anniversary date of your approval. Your first report is due [12 months from 'Ethics Committee Approval' date]. You will be sent a courtesy reminder by email closer to this due date.  
Clause 2.35 of the National Statement states:  
*As a minimum an HREC must require at regular periods, at least annually, reports from principal researchers on matters including:*
  - a) *Progress to date or outcome in case of completed research;*
  - b) *Maintenance and security of records;*
  - c) *Compliance with the approved protocol, and*
  - d) *Compliance with any conditions of approval.*
- 8) A *Final Report* and a copy of the published material, either in full or abstract, must be provided at the end of project.

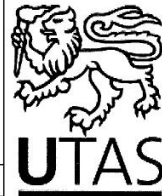
Yours sincerely



 Ethics Executive Officer

COPY

Private Bag 01 Hobart  
Tasmania 7001 Australia  
Telephone (03) 6226 2764  
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Marilyn.Knott@utas.edu.au  
<http://www.research.utas.edu.au/index.htm>



MEMORANDUM

HUMAN RESEARCH ETHICS COMMITTEE (TASMANIA) NETWORK

**AMENDMENT TO EXISTING APPLICATION APPROVAL**

26 August 2009

Professor Ian Hay  
Faculty of Education  
Private Bag 1308  
Launceston

**Ethics reference: H10137**

**Investigating the function of Sameness Behaviour in children with Autism.**

**PhD candidate: Nadia Ollington**

Dear Professor Hay

The Chair of the Tasmania Social Sciences Human Research Ethics Committee approved the Amendment to the above project on 24 August 2009.

Amendment description:

Request to include questions regarding language functioning to the general questionnaire; changes to mailing procedure and contact with participants.  
Full details as per formal ethics amendment submitted for approval.

Yours sincerely

Ethics Executive Officer

A PARTNERSHIP PROGRAM IN CONJUNCTION WITH THE DEPARTMENT OF HEALTH AND HUMAN SERVICES

## Appendix C

### Information Sheet and Consent Forms



Faculty of Education

School of Education, University of Tasmania, Private Bag 66, Hobart, Tasmania, 7001, Australia.

Tel: +61 3 6226 2810; Fax: +61 3 6226 2569. E-mail: [Nadia.Ollington@utas.edu.au](mailto:Nadia.Ollington@utas.edu.au)

#### Investigating the Function of Sameness Behaviour in Autism

Dear Parent,

Thank you for showing interest in this research, in which I hope that you will allow your child to participate. I write to tell you about it, and the part your child would take. If you would like your child to take part in the research, I have enclosed a Consent Form for you to sign and return in the enclosed stamped envelope.

My name is Nadia Ollington and I am the student researcher, undertaking this research as part of my candidature for the degree of Doctor of Philosophy in the Faculty of Education. The research will investigate maintenance of sameness and resistance to change in typically developing children and children with autism. Findings from this research will help us to find new ways of teaching children with autism how to cope with change.

I am happy to be available to answer all of your questions and describe any details of the research that you may be unsure about after reading the Information Sheet attached to this letter. Please feel free to contact me or my supervisors Professor Ian Hay and Professor Joan Abbott Chapman at any time if you have any questions or concerns. My contact details and the contact details of my supervisors in this project appear on the Information Sheet.

It is important that you are aware that I have not requested or been given access to any contact details or private information concerning you or your child, unless you have freely provided this information yourself. All information obtained from this study will be strictly confidential and there will be no identifiable information including your child's name contained in any publications arising from this work.

This research has gained approval from the Human Research Ethics Committee (Tasmania) Network. The ethics reference number is H10137. Should you have any concerns about the research, please contact the Ethics Executive Officer (phone 03 6226 7479; email: [human.ethics@utas.edu.au](mailto:human.ethics@utas.edu.au)).

Please also understand that your child's participation in this research is completely voluntary. You and your child have the right to refuse to participate in this research or to withdraw participation at any time without prejudice. I do hope you will agree to let your child participate.

I look forward to hearing from you further,

Sincerely,

Nadia Ollington  
Phone: 62 262810

Professor Ian Hay  
Phone: 6324 3144

Professor Joan Abbott Chapman  
Phone: 62 262549

*Information Sheet Regarding a Research Project*  
The University of Tasmania

Investigating the Function of Sameness Behaviour in Autism

**INFORMATION ABOUT THE STUDY**

*Background and purpose of the research*

This research is an extension of a previous study carried out by Professor Jeff Sigafoos and Associate Professor Vanessa Green to reduce insistence on sameness and resistance to change in children with autism. While these behaviours are known to be common in children and adults with autism, they are also apparent in typically developing children for a period of time early in their development. A comparison of these behaviours in children with autism and typically developing children will help to understand this behaviour in autism.

The purpose of this research is to determine whether there are distinct motivating factors behind an insistence on sameness or resistance to change in young children with and without autism. Identifying possible reasons for the behaviour associated with events of this type will help to provide information to be used in intervention to reduce the behaviour.

*How and where will the research take place?*

The first phase of this research requires your involvement as a parent. Your child will not be directly involved in this phase. Firstly, I will be providing you with two packages (reply paid) containing a number of assessments and questionnaires for you to fill out and simply seal and post at your convenience. The first package (labelled 1) will include; the Motivation Assessment Scale (MAS), the Sensory Profile, the Gilliam Autism Rating Scale – Second Edition (GARS-2) and the Behavioural Flexibility Rating Scale-Revised (BFRS-R). The second package (labelled 2) will include; The Sameness Questionnaire, the Aberrant Behavior Checklist (ABC), the Childhood Autism Rating Scale (CARS) and a page requiring you to fill out some descriptive information that is important to the research. Completing these packages should take no more than one half hour of your time. Packages will include detailed instructions to help you with this task. You do not have to fill out all of the questionnaires at once. You can take a few days to complete them if necessary. You will also not need to score the questionnaires, as it is important that this is performed by a trained professional. I will also make an appointment with you at your convenience to complete the Vineland Adaptive Behaviour Scales – Second Edition (VABS-II) either by telephone, or in person. Please do not hesitate to contact me if you are having difficulty completing questionnaires. I will be more than happy to assist if required.



Following this, I will be sending out letters of invitation to take part in phase two. In this phase I will be looking for specific behaviour patterns. This phase will take place either in your child's classroom or at your home, whichever suits you. Your child will be directly involved in this phase of the research, however you will not be expected to be directly involved, nor will you have to do anything extra related to this phase of the research. In this phase I will be examining your child's behaviour directly following the creation of a few of the situations that you suggested were a problem in the first phase of the research, for example a change in routine or an unexpected event. This will occur during a play situation, where I will be playing games, or playing with toys with your child. The procedures will involve presenting a change to your child during play and then responding in a number of ways, for example giving positive attention or by simply resuming the game. While doing this, I will watch your child and record your child's behaviour. I will also be recording these episodes with a video camera to enable the recording of important information that may be otherwise missed by the researcher. This phase of the research would require about 15 minutes per day, 2 or 3 days per week for about 5-8 weeks. On at least one out of three occasions I will also have another researcher attending the session to record data simultaneously.

**Will there be any discomfort or risk to my child?**

While it is not foreseen that there will be any risk of physical or psychological injury or major social or legal risks to your child as a result of participation in this research, it is anticipated that during the second phase of the research, the presentation of change during the play situation may cause your child to become temporarily frustrated. This will be managed by allowing such frustration to go on for only a brief period. If your child remains distressed the trial will be discontinued or postponed to recommence on another occasion. Access to a trained counsellor will also be made available.

**What are the benefits of this research?**

The results of this research will provide important information to be used to teach children with autism how to cope with and tolerate changes in their daily life. This will not only be beneficial in the home, but also in the school and in other social arenas.

**Will you receive compensation for your participation in this research?**

There is no compensation for participating in this research.

**Will participation in this research cost anything?**

Participation in this research is free of cost to both you and your child.

**Can my child be identified, and will the information I am giving be kept private?**

Some basic descriptive information about your child will be collected in the first phase of the research. If your child goes on to participate in the second phase, we will be recording his/her behaviour with a video camera and writing down notes. All of this information will be strictly confidential and will be kept in a locked filing cabinet in the Faculty of Education at the

University of Tasmania. The data will be kept for at least 5 years after it has been published. Following this, all data and video footage will be shredded and discarded.

Any publications arising from this work, will ensure that your child not be identified or identifiable. All data will be coded, and descriptive information used in publications will appear under a made-up name.

If your child is participating in the second phase and you decide that you would like the research to take place at his/her school, a letter will be sent to the principal outlining the research and requesting consent for the research to take place in the school. All of the details concerning your particular child however will be strictly confidential, and no details of the outcome for your child will be divulged to anyone in the school. Any reports about the research will only state that the research took place in the child's school and will give a brief description of the school without revealing the name or location of the school.

**Can the information I give be used to obtain a diagnosis for my child?**

The information that you provide will be used only for research purposes and will in no way be used to determine relevant features of, or assign a diagnosis of any childhood disorder. The information will simply be used to indicate the existence of different behaviours, and is purely intended to identify the motivation of problem behaviour associated with maintenance of sameness.

**Will I be able to find out the details of my child's involvement during the research?**

You have the right to look at any or all of the data that we have collected on your child at any time. We would also be more than happy to discuss any data involving your child, your child's involvement or your child's results at any time. You can contact me or my supervisors at any time during the research and we will arrange a convenient way for you to look at this information or find a suitable time to meet and discuss your child's participation. Any results of the research will also be made freely available to you. You may request a copy of any publications that may arise from this research at any time. I would like you to feel fully informed of your child's progress and also that you are free to talk to me or my supervisors at any time about any concerns or questions that you have about the research, the data, and the results.

**Protection of your child's research records**

It is the legal right of authorised persons from the University of Tasmania and the Human Research Ethics Committee (Tasmania) Network to review the research records. Protection of the confidentiality of those records will be maintained to the extent permitted by law. Otherwise, your research records will not be released without your consent unless required by law or a court order. If the results of this research are published or presented at scientific meetings, your child's identity will not be disclosed.

**Will the investigators benefit from this research?**

I am required to conduct and publish research as part of my Doctoral Research Candidature. However, there will be no direct financial benefit to myself or my supervisors related to your participation in this research.

### **How can I withdraw from this research?**

Participation in this research is entirely voluntary. You have the choice to refuse to allow your child to take part in the research, or to withdraw your child at any time following consent, without prejudice.

If you wish to remove your child from participation in this research for any reason, you may contact the investigators, or the school principal (if relevant in the second phase). You may also withdraw any data that has been collected on your child as part of this research. I will ensure that you are up to date with any new information that might affect your decision to remain in the research project.

### **Has this research been approved by an ethics committee?**

This research has been approved by the Human Research Ethics Committee (Tasmania) Network. The ethics reference number is H10137.

You may contact the Ethics Executive Officer with any problems or concerns about the conduct of this research (phone 03 6226 7479; email: [human.ethics@utas.edu.au](mailto:human.ethics@utas.edu.au)).

### **Name and Contact Details of the Investigators:**

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Private Bag 66, Hobart, Tasmania, 7001, Australia.  
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E-mail: [Nadia.Ollington@utas.edu.au](mailto:Nadia.Ollington@utas.edu.au)
2. Ian Hay, Professor, Dip T (NBCAE), BA psy (UQ), Med St (UQ), PhD (UQ), MAPS,  
MACE, FIARLD  
Dean of Education  
School of Education, University of Tasmania  
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3. Joan Abbott-Chapman, Professor, M:A (Hons), PhD (Edin), FACE  
Professor in Education  
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E-mail: [J.AbbotChapman@utas.edu.au](mailto:J.AbbotChapman@utas.edu.au)

Thank you for taking the time to read this information sheet. I hope that you will be willing to allow your child to participate in this research.

*Consent Form Regarding a Research Project*  
The University of Tasmania

Investigating the Function of Sameness Behaviour in Autism

CONSENT FORM FOR PARENTS

1. I have read and understood the Information Sheet for this research.
2. I understand the nature of my involvement in this research. I understand that Phase 1 will require me to complete six assessments and questionnaires about my child and his/her behaviour. I also understand that Phase 1 will not include any direct involvement by my child. I understand that my child may or may not be asked to participate in Phase 2 where the researcher will directly assess my child's behaviour in relation to problem situations. These assessments will occur in my home, if I so choose, and/or in my child's classroom.
3. I understand that the investigators do not foresee any potential physical, psychological, social, legal, or other risks to me or my child as a result of participating in this research.
4. I understand that all data involved with this research will be securely stored in a locked cabinet on the University of Tasmania premises for at least five years, and will be destroyed at the end of this period.
7. Any questions that I have asked have been answered to my satisfaction.
8. I agree that data gathered for the research may be published provided that my child's identity, and that of the teacher and the school, is not disclosed.
9. I understand that my child's identity and the teachers' and school's identity will be kept confidential and that any information that is supplied to the researcher(s) will be used only for the purposes of the research.
10. I agree to allow my child to participate in this investigation and understand that I may withdraw my permission at any time without any negative effect. I can also withdraw any data that has been collected about my child at any time.



Faculty of Education

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***Consent Form Regarding a Research Project***  
The University of Tasmania

Investigating the Function of Sameness behaviour in Autism

**CONSENT FORM FOR PARENTS**

Name of Child: \_\_\_\_\_

Name of Parents or Guardians: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_

(Home) \_\_\_\_\_ (Work) \_\_\_\_\_ (Mobile) \_\_\_\_\_

Parent or Guardian Signatures:

\_\_\_\_\_ Date: \_\_\_\_\_

**Signed Statement by Investigator:**

The Parents or Guardians have received the Information Sheet in which my details, my supervisor's details and the Human Research Ethics Committee (Tasmania) details have been provided so that they have had the opportunity to contact us prior to them consenting to participate in this project.

Nadia Ollington \_\_\_\_\_ Date: \_\_\_\_\_

## Appendix D

### Behavioural Flexibility Rating Scale-Revised (BFRS-R)

*Behavioural Flexibility Rating Scale — Revised (08/02/2007)*

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#### **Demographic Information**

1. Gender of person: \_\_\_\_\_ ☐ Male or ☐ Female
2. This person is \_\_\_\_\_ years old
3. The person's main diagnosis is: (Check the one item that best describes the person's diagnosis)  
☐ Autism ☐ Asperger syndrome ☐ Down syndrome ☐ Other (Please specify) \_\_\_\_\_
4. The person's level of speech is: (Check the one item that best describes the person's level of speech development)  
☐ Does not speak ☐ Speaks only a few single words/sentences ☐ Mainly nonfunctional speech/echolalia ☐ Fluent speech
5. The person's level of Intellectual Disability is: (Check the one item that best describes the person's level of Intellectual Disability)  
☐ Superior (IQ above 115) ☐ Average (IQ 85-115) ☐ Below average (IQ 75-84) ☐ Mild (IQ 55-74) ☐ Moderate (IQ 35-54) ☐ Severe (IQ less than 34)
6. I am the person's: ☐ Parent ☐ Teacher ☐ Other (Please specify) \_\_\_\_\_ and have known this person for \_\_\_\_\_ years and \_\_\_\_\_ months

## ***Background***

The Behavioural Flexibility Rating Scale (BFRS-R) seeks to assess to what extent various SITUATIONS AND CHANGES cause problems for the person. The BFRS-R can be completed by parents, teachers, or other individuals who know the individual well enough to provide accurate information about the person's ability to be flexible and cope with change. Generally, anyone who has known and cared for the individual for at least 6 months could complete the BFRS-R.

## ***Directions***

Please rate the extent to which each of the following 16 situations is a problem for the individual by marking the best answer.

0 – means that the situation is ***not at all a problem*** for the person. He or she copes easily with the situation.

1 – means that the situation causes only ***mild*** or ***minor problems*** and that these are only short-lived. The person might complain or fuss a little bit and for a short period of time (less than 1 minute), but then accepts the change and copes with the situation.

2 – means that the situation causes ***moderate*** problems. The person might become agitated and upset for 1-2 minutes. He/she might even tantrum mildly (e.g., stomp their feet, cry), but eventually the person accepts the situation and calms down.

3 – means that the situation causes ***severe*** problems. The situation may lead to a major tantrum. The tantrum might include aggression, screaming, and/or self-injury. The person never accepts the situation and things have to be returned to how they were before or the person has to be removed from the situation to calm down.

<i>To what extent is each of the following situations a problem for the person?</i>	<i>Severity of the Problem</i>			
	No	Mild	Moderate	Severe
1. A commonly used object is misplaced and cannot be found.	0	1	2	3
2. A planned event is delayed or cancelled with little warning because of unforeseen circumstances.	0	1	2	3
3. The person is required to move from their current location and go to another location.	0	1	2	3
4. An object in the environment has been moved or repositioned from its usual location or position.	0	1	2	3
5. The person is required to try something new, for example new foods or change of clothing.	0	1	2	3
6. An object or some materials that the person was using breaks or malfunctions.	0	1	2	3
7. A usual routine is altered or changed, for example the parent takes a new route home from school.	0	1	2	3
8. An unexpected interaction occurs with another person, for example a stranger tries to talk to the person.	0	1	2	3
9. The person becomes momentarily separated from his/her family or group.	0	1	2	3
10. Materials run out, causing a premature end to an activity.	0	1	2	3
11. Another person is doing something annoying, for example making noise.	0	1	2	3
12. Objects or materials are not returned to their proper place at the end of an activity.	0	1	2	3
13. A new object, item, or person has been added to the environment.	0	1	2	3
14. An activity is interrupted before the person was able to finish the task.	0	1	2	3
15. A new activity is introduced into the person's routine.	0	1	2	3
16. The person makes a mistake while doing some task or while they are engaged in an activity.	0	1	2	3



## Appendix E

### The Sameness Questionnaire

#### The Sameness Questionnaire – (Prior & MacMillan, 1973)

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##### **Demographic Information**

1. Name of person: \_\_\_\_\_ Gender: ☐ Male or ☐ Female
2. This person is: \_\_\_\_\_ years old
3. I am the person's: ☐ Parent ☐ Teacher ☐ Other \_\_\_\_\_ (Please specify)  
and have known this person for \_\_\_\_\_ years and \_\_\_\_\_ months

##### **Background**

The Sameness Questionnaire seeks to assess to what extent various sameness behaviours occur for the person. The Sameness Questionnaire can be completed by parents, teachers or other individuals who know the individual well enough to provide accurate information about the person's desire for maintenance of sameness. Generally, anyone who has known or cared for the individual for at least 6 months could complete the Sameness Questionnaire.

##### **Directions**

Please rate the extent to which each of the following behaviours is evident for the individual by marking the best answer.

0 – means that the behaviour is not present for the person. He or she does not show this particular desire for sameness or a desire for sameness relevant to that described.

1 – means that the behaviour is present to some degree. The behaviour is present, but not strongly marked.

2 – means that the behaviour is present to a considerable degree. The behaviour is severe, marked, or frequent.

<i>To what extent does each of the following behaviours occur for your child?</i>	<i>Extent of the Behaviour</i>		
	Not Present	To Some Degree	To a Considerable Degree
1. Does your child insist on furniture remaining in the same place, windows or doors open or shut, blinds up or down, etc.?	0	1	2
2. Does your child insist on creating and maintaining patterns of toys, objects, furniture, etc.?	0	1	2
3. Does your child insist in eating the same foods or only a particular kind of food?	0	1	2
4. Does your child object to visiting new places?	0	1	2
5. Does your child refuse to allow anyone to teach him/her anything new?	0	1	2
6. Does your child become very upset if interrupted in what he/she is doing?	0	1	2
7. Does your child make a ritual out of (a) going to bed, (b) eating meals, (c) Having a bath, (d) getting dressed?	0	1	2
8. Is your child extremely attached to a particular toy or object?	0	1	2
9. Does your child line things up in rows and refuse to have them disturbed?	0	1	2
10. Does your child insist on drinking from one particular container or eating from one particular plate?	0	1	2
11. Does your child insist on walking in straight lines?	0	1	2
12. Does your child continually turn taps or light switches on and off, flush toilets etc.?	0	1	2
13. Does your child make the same repetitive, ritual-like movements?	0	1	2
14. Does your child continually twist pieces of string, wire, etc., or manipulate other objects repeatedly?	0	1	2

<i>To what extent does each of the following behaviours occur for your child?</i>	<i>Extent of the Behaviour</i>		
	Not Present	To Some Degree	To a Considerable Degree
15. Does your child insist on using the same route (a) when out for a walk, (b) when out in the car?	0	1	2
16. Does your child refuse to wear new clothes?	0	1	2
17. Does your child insist on wearing the same clothes?	0	1	2
18. Does your child insist that clothes must be (a) put on in a certain way, (b) worn the same way always, (c) covering certain parts of the body (e.g., hands)?	0	1	2
19. Does your child insist on his/her food being cooked (or served) in a special way?	0	1	2
20. Does your child insist on sitting at the same place at a table or in the same chair?	0	1	2
21. Is your child extremely attached to any person or persons?	0	1	2
22. Does your child insist on toys being set up, put out, or put away in a particular order?	0	1	2
23. Does your child dislike changes in appearance or behaviour of the people around him?	0	1	2
24. Does your child insist on using a particular door?	0	1	2
25. Does your child like the same CD or piece of music, played continually?	0	1	2
26. Does your child use verbal rituals by insisting on the same reply to questions each time, or saying the same thing in a particular situation?	0	1	2
27. Does your child like to talk about the same things all the time?	0	1	2
28. Does your child sing the same tunes or repeat the same sentences?	0	1	2

## **Appendix F**

### **Operational Guidelines**

#### **OPERATIONAL GUIDELINES PBFA**

##### **SITUATION (SIT) = BFRS-R SITUATION**

**MTK** = CHILD MAKES A MISTAKE

**MSP** = AN ITEM IS MISPLACED AND CANNOT BE FOUND

**INTUPT** = PLAY IS INTERRUPTED BEFORE THE CHILD IS ABLE TO  
FINISH PLAYING

**NEWACT** = A NEW ACTIVITY IS INTRODUCED INTO CHILD'S ROUTINE

**MATOUT** = MATERIALS RUN OUT CAUSING PREMATURE END TO PLAY

**DEL** = PLANNED EVENT IS DELAYED OR CANCELLED

**CHMOV** = CHILD IS REQUIRED TO MOVE FROM CURRENT LOCATION

**OBMov** = AN OBJECT IS MOVED FROM USUAL PLACE

**ROUT** = A USUAL ROUTINE IS ALTERED OR CHANGED

**TRYNEW** = CHILD IS REQUIRED TO TRY SOMETHING NEW

**INTACT** = UNEXPECTED INTERACTION

**SEP** = CHILD IS MOMENTARILY SEPARATED FROM GROUP

**ANN** = ANOTHER PERSON IS DOING SOMETHING ANNOYING

**RET** = OBJECT OR MATERIALS NOT RETURNED TO THEIR PROPER  
PLACE

**NEWADD** = A NEW OBJECT, ITEM OR PERSON IS ADDED TO  
ENVIRONMENT

**ACTNEW** = A NEW ACTIVITY IS INTRODUCED INTO ROUTINE

##### **CONDITION (COND) = FUNCTIONAL CONDITION**

**ATTENTION (AT)** = THE CHILD IS SHOWN ATTENTION, E.G. WORDS OF  
SUPPORT, COMFORT.

**ESCAPE (ES)** = THE CHILD IS ABLE TO ESCAPE THE SITUATION BY MOVING ON TO ANOTHER GAME OR MOVING AWAY

**RESTORE (RE)** = THE ENVIRONMENT IS RETURNED TO ITS ORIGINAL STATE (I.E.BEFORE MANIPULATION)

**TANGIBLE (TA)** = THE CHILD IS OFFERED A PREFERRED TANGIBLE ITEM (IN VIEW)

**PLAY – NATURAL/TOY** = TYPE OF PLAY, EITHER NATURAL OR TOY/GAME

**NATURAL (N)** = THE CHILD’S USUAL/PREFERRED PLAY ACTIVITIES

**TOY (T)** = OWN TOYS AND GAMES OR FROM THE RESEARCHER’S PROTOCOL

### **BEHAVIOUR**

**30 SEC PRE/NO MANIP** = BEHAVIOUR PRIOR TO MANIPULATION OR DURING BASELINE

**30SEC MANIP** = BEHAVIOUR 30 SECS FOLLOWING SITUATIONAL MANIPULATION

**30 SEC POSTMANIP** = BEHAVIOUR FOLLOWING CONDITIONAL MANIPULATION, E.G. AT, RE, TA OR ES

**0** = NO PROBLEM BEHAVIOUR OBSERVED

**1** = MILD PROBLEM BEHAVIOUR OBSERVED, E.G.COMPLAINING, WHINGING, PROTESTING.

**2** = MODERATE PROBLEM BEHAVIOUR OBSERVED, E.G. FOOTSTOMPING, YELLING/SHOUTING, THROWING ITEMS.

**3** = SEVERE PROBLEM BEHAVIOUR OBSERVED, E.G. TANTRUM.

## Appendix G

### Record Sheet (Play-based functional assessment)

## PLAY BASED FUNCTIONAL ASSESSMENT

Name..... Primary..... Secondary.....

[illegible]

CONDITION ORDER

[illegible]

Conditions were given a number from 1-12 and randomly allocated to trials using a random number generator: <http://www.randomizer.org>

## Appendix H

### Reinforcer Checklist

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

#### Reinforcers Checklist

*Children are more likely to be motivated to continue a new task/activity if he/she is rewarded. For each category please list the things your child/ward considers as a reward, so that we can have a list of options to choose from so that we can select rewards that are appropriate for your child. Feel free to list as many things as possible.*

**Edible Rewards** (e.g. favourite food items)

**Material rewards** (e.g. toys or other objects that the child likes)

**Social rewards** (e.g. tickling, praise (please specify), hugs etc.)

**Activity Rewards** (e.g. clapping hands, playing outside, flushing toilet etc.)